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MONTANA AIR QUALITY DATA AND INFORMATION SUMMARY FOR 1984

Prepared by:
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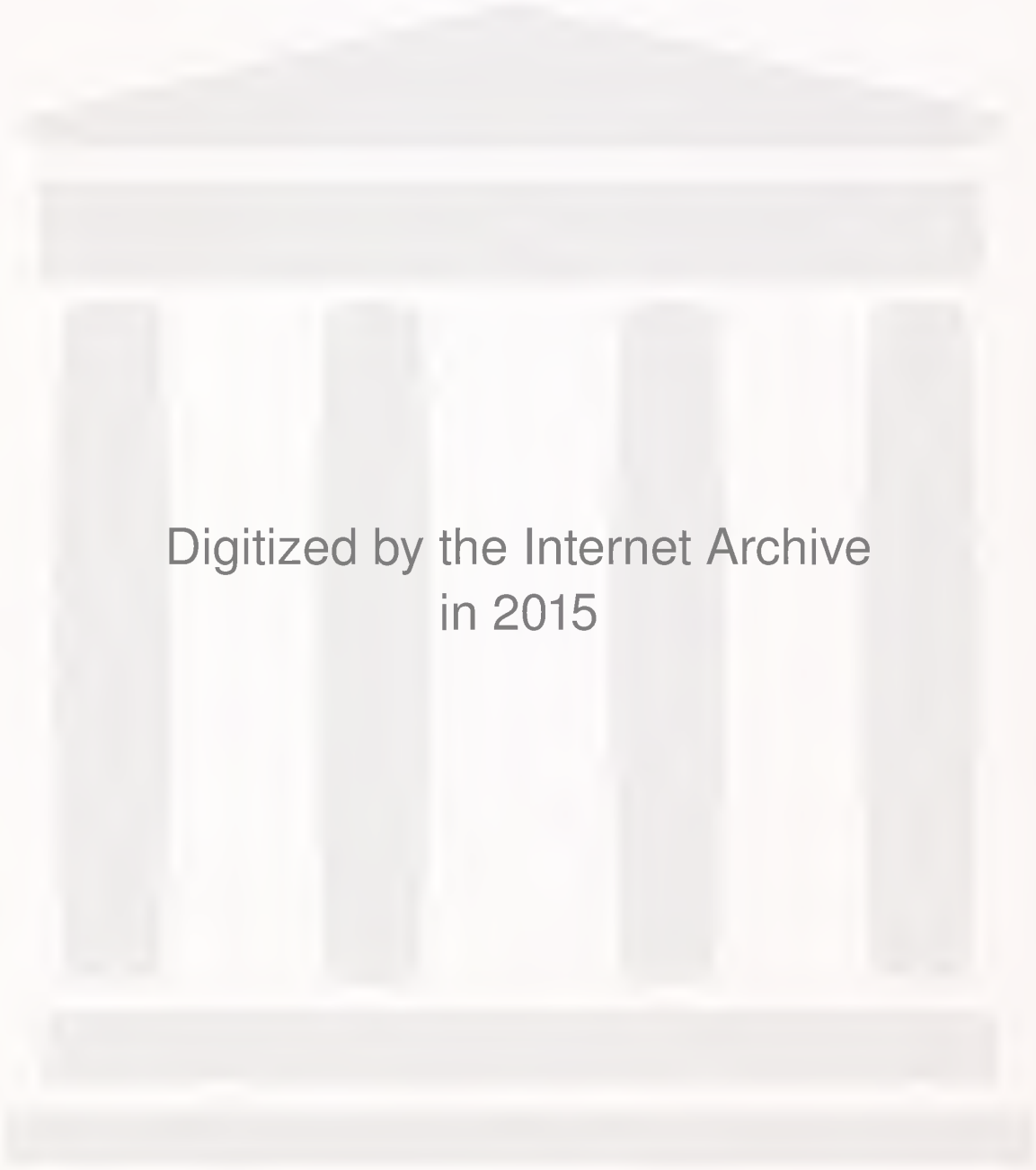
Department of Health and Environmental Sciences
Helena, Montana 59620

July 1985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INTRODUCTION

INTRODUCTION

The purpose of the Montana Air Quality Data and Information Summary for 1984 is to summarize air quality data from various regions in the state and to provide information on air quality topics.

The regional summaries provide an overview of monitoring activities in each Air Quality Control Region (AQCR) (See Appendix Q for a state map showing AQCR's). Within each region, various background information is provided. This includes: location of the AQCR, physical features, population, types of pollution sources, monitoring site descriptions, inventory of parameters monitored at each site and summaries of the air quality data.

The air quality data summaries have been tabulated to show the following: site code, site name, year of record, month, number of observations, first, second and third maxima, arithmetic mean, three-hour maximum (SO_2), eight-hour maximum (CO), 24-hour maximum (SO_2), and geometric mean (TSP).

In AQCR 140 (south central Montana), the major air pollution problem involves SO_2 in Billings from a coal-fired power plant and three oil refineries. Particulate matter is also of some concern. There was one violation of the Montana annual TSP standard in Billings. Violations of the Montana 24-hour SO_2 standard occurred at two sites. There were no violations of the Montana annual SO2 standard due to insufficient data collection.

In AQCR 141 (north central Montana), a minor problems exist with carbon monoxide and particulate matter in Great Falls. There were, however, no violations of any standards in this region.

In AQCR 142 (southwest Montana), the major air pollution problems involve particulate matter, lead and fluoride. Two sites had violations of the federal 24-hour TSP standard while four sites had violations of the Montana 24-hour TSP standard. There were two sites that had violations of the Montana annual TSP

standard. Lead concentrations in East Helena were quite high and resulted in fifteen violations of the federal calendar quarter standard. Fluoride in vegetation measured in Silver Bow County resulted in five violations of the monthly fluoride standard and two violations of the grazing season standard.

In AQCR 143 (eastern Montana), there were no violations of any air pollution standards. Sulfur dioxide was a minor problem; sources included coal-fired power plants and oil well flares and vents.

In AQCR 144 (western Montana), the major air pollution problem is particulate matter. There is also some concern with carbon monoxide and fluorides in the region. There were four sites that violated the federal and Montana annual TSP standards. There were eight sites that violated both the federal and Montana 24-hour TSP standards. The region had one violation of the eight hour CO standard and one violation of the monthly fluoride standard.

In the second half of this report, several appendices are provided on a variety of topics relating to air quality. These include discussions on Prevention of Significant Deterioration, Attainment-Nonattainment Designations, Ambient Air Quality Standards, Smoke Management and Visible Emission Documentation. Other miscellaneous tables, lists and short reports are included for the reader's benefit and informational needs.

This report was compiled for use by the general public. The subject of air quality is often complicated and data intensive. As a consequence, it cannot be covered completely in any one report. The Department hopes that this report will serve the needs of most users. If not, additional information may be requested.

AQCR 140

INTRODUCTION

This section deals with the air monitoring activities and pollution concerns in AQCR 140.

LOCATION AND PHYSICAL FEATURES

AQCR 140 is located in southcentral Montana. Physical features include mountainous areas, foothills and sedimentary plains. The Yellowstone and Musselshell Rivers flow from west to east and cut through the region. The Missouri River borders the region on the north. Wyoming borders it on the south. Figure 1 shows a regional map.

POPULATION

The population of AQCR 140 is 173,500 (1984 estimate) or 21.0 percent of the state population. The majority of the people in this region live in Yellowstone County (Billings and Laurel).

POLLUTION SOURCES

Pollution sources and types of pollutants are listed for each county in the region. A final category lists the types of sources that would be expected in all counties in the region. The sources by county are as follows:

Big Horn County

Four coal strip mines (particulates)

Carbon County

Calcium manufacturing (particulates)

Fergus County

Gypsum manufacturing (particulates)

Wheatland County

Sawmill (particulates)

Yellowstone County

Three oil refineries (SO_2, H_2S, NOx, SO_3, particulates)
Coal-fired power plant (SO_2, NOx, particulates)
Sugar beet refinery (SO_2, NOx, particulates)
Sulfur plant (SO_2, SO_3)
Grain processing (particulates)

All Counties

Asphalt plants (particulates)
Gravel crushers (particulates)
Home heating devices (particulates, CO)
Automobiles (CO, NOx, re-entrained particulates)
Agricultural activities (particulates)
Wind erosion (particulates)

MONITORING SITE DESCRIPTIONS

A number of monitoring sites were in operation during 1984. Table 1 lists the monitoring site descriptions. This includes site codes, site name, supporting agency, station type, project description, city name and county name.

Table 2 gives an inventory of pollutants and wind parameters measured at each site.

DATA SUMMARY

Total Suspended Particulates

TSP was monitored at six sites in this region in 1983. Two of the sites were collocated. The maximum 24-hour observation was 191 ug/m^3 at the Taft School site in Billings. The highest annual geometric average was 68.6 ug/m^3 also at the Taft School site. The annual arithmetic average at Taft School (81.0 ug/m^3) violated the Montana annual standard. There were no violations of the primary 24-hour standards for TSP. Table 3 summarizes the TSP data for this region.

Carbon Monoxide

Carbon monoxide was monitored at one location (Metra-Fairgrounds) in this region. The maximum one hour observation was 11.1 ppm. The maximum eight hour observation was 7.0 ppm. There were no violations of the CO standards. Table 4 summarizes the CO data at the Metra site.

Sulfur Dioxide

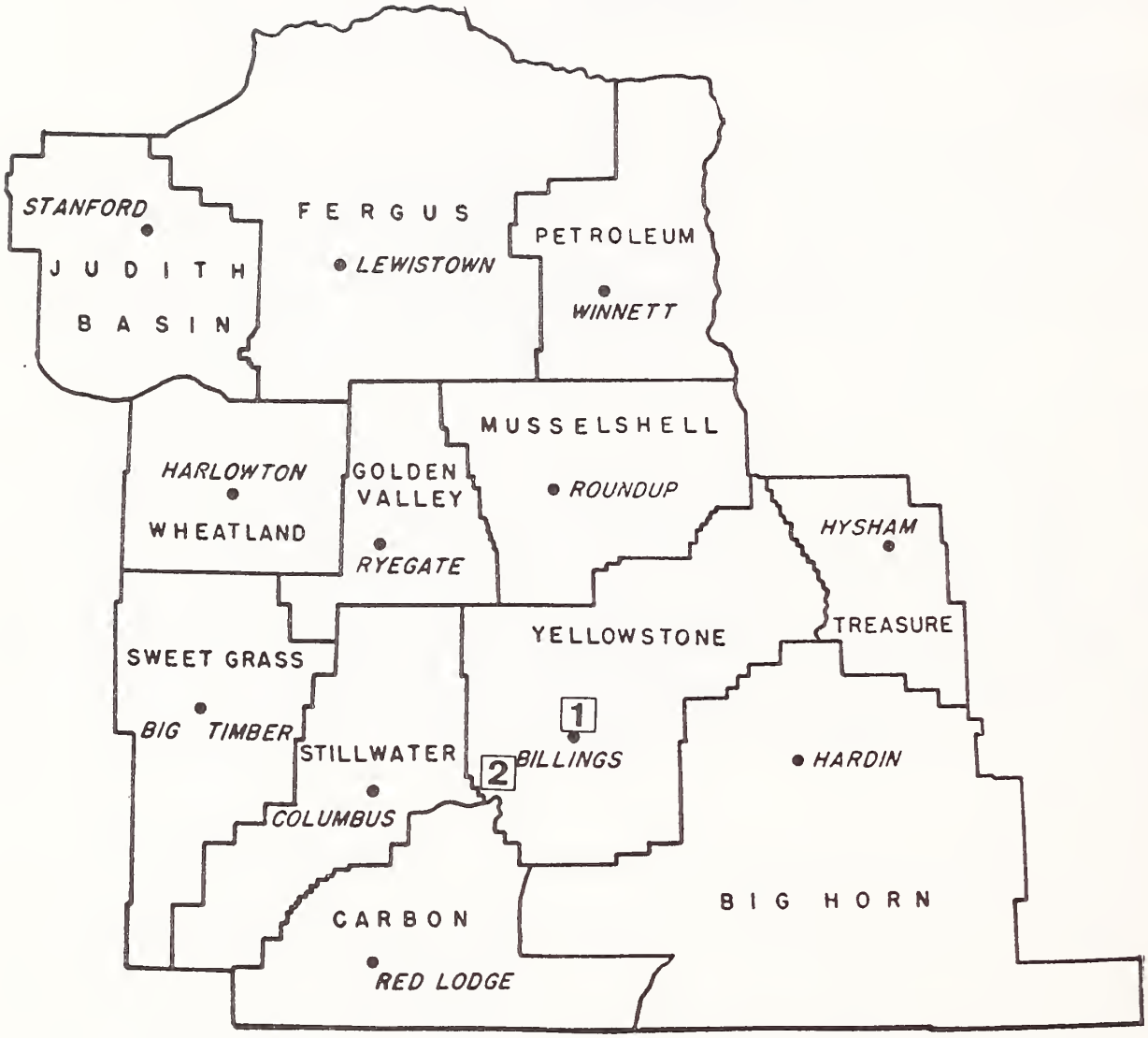
Sulfur dioxide was monitored at three sites in this region in 1984. The maximum one hour reading was .550 ppm at the Lockwood Park site. The maximum three hour average was .448 ppm at North Johnson Lane. The maximum twenty-four average was .121 ppm at the Coburn Road site. The highest annual average in the area was .026 ppm at the Lockwood Park site. There were no violations of the Federal standard; however, Lockwood Park had one violation of the Montana 24-hour standard and Coburn road had five violations. There were no violations of the annual standards because the minimum number of valid hours (6570) was not monitored. Table 5 summarizes the SO_2 data for this region.

Sulfation Rate

Sulfation Rate was monitored at 36 sites in Yellowstone County. The highest monthly observation was 2.74 mg $SO_3/cm^2/day$ at the Farm East of CENEX site. The highest annual average was 1.12 mg $SO_3/cm^2/day$ at the Johnson Road North site. There is no standard for sulfation rate; readings greater than .5 mg $SO_3/cm^2/day$ indicate possible trouble spots and warrant continued sampling. Table 6 summarizes the sulfation rate data.

FIGURE

AQCR 140 - REGION MAP



MONITORING SITE LOCATIONS

1. Billings
2. Laurel

TABLE 1a
AQCR 140 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0080 001 G 02	214 PUEBLO STREET YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 003 G 02	113 BITTERROOT DRIVE YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-NEAR URBAN SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 004 G 02	114 JOHNSON LANE YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-AGRICULTURAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 006 G 02	LOCKWOOD SCHOOL YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-INDUSTRIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 007 G 01	KGHL STATION, WEST OF BILLINGS ON HWY 10 YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-AGRICULTURAL POPULATION ORIENTED	BILLINGS YELLOWSTONE
0080 008 G 01	CITY HALL, 3RD AVE NORTH & 27TH STREET YELLOWSTONE COUNTY AIR POLLUTION CONTROL	CITY CENTER-COMMERCIAL POPULATION ORIENTED	BILLINGS YELLOWSTONE
0080 008 G 07	CITY HALL COLOCATED HIVOL YELLOWSTONE COUNTY AIR POLLUTION CONTROL	CITY CENTER-COMMERCIAL QA-COLOCATED SAMPLER	BILLINGS YELLOWSTONE
0080 009 G 01	GRAND AVENUE SCHOOL, 1320 GRAND AVENUE YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-COMMERCIAL POPULATION ORIENTED	BILLINGS YELLOWSTONE
0080 010 G 02	GARDEN AVENUE YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-INDUSTRIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 011 G 02	33RD STREET AND 2ND AVENUE NORTH YELLOWSTONE COUNTY AIR POLLUTION CONTROL	CITY CENTER-COMMERCIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 014 G 02	MOUNTAIN VIEW BLVD YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 017 G 02	MINNESOTA AVENUE, 1/2 MI NE OF CONOCO YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-INDUSTRIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 018 G 02	6TH STREET & SOUTH 28TH YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 019 G 02	SOUTH 27TH & 11TH AVENUE SOUTH YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-COMMERCIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 021 G 02	EAST OF CONOCO REFINERY YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-INDUSTRIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 022 G 02	TWO MOON PARK, A MILE NE OF CONOCO YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-INDUSTRIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE

TABLE 1b
AQCR 140 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0080 025 G 02	STATE STREET & 3RD SOUTH YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 027 G 02	NEWMAN SCHOOL, STONE & S BILLINGS BLVD YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 028 G 02	BENCH SCHOOL, MILTON ROAD YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 032 G 02	KLENCK LAND, 3/4 MILE S OF EXXON REFINERY YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-INDUSTRIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 034 G 02	PICCOLO & FRONTAGE ROAD YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-INDUSTRIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 037 G 02	JOHNSON & LOCKWOOD YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-AGRICULTURAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 038 G 02	JOHNSON ROAD NORTH, 1 MILE NE OF EXXON YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-AGRICULTURAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 061 F 02	METRA PARKING LOT,6TH AVE & EXHIBITION DR MONTANA AIR QUALITY BUREAU	CITY CENTER-COMMERCIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 062 F 01	TAFT SCHOOL WEST, 623 S 25TH STREET MONTANA AIR QUALITY BUREAU	CITY CENTER-INDUSTRIAL POPULATION ORIENTED	BILLINGS YELLOWSTONE
0080 062 F 07	TAFT SCHOOL EAST, 623 S 25TH STREET MONTANA AIR QUALITY BUREAU	CITY CENTER-INDUSTRIAL QA-COLOCATED SAMPLER	BILLINGS YELLOWSTONE
0080 064 F 05	NORTH JOHNSON LANE MONTANA AIR QUALITY BUREAU	SUBURBAN-INDUSTRIAL SPECIAL STUDIES	BILLINGS YELLOWSTONE
0080 065 F 01	LOCKWOOD PARK (NAMS SITE) MONTANA AIR QUALITY BUREAU	SUBURBAN-RESIDENTIAL POPULATION ORIENTED	BILLINGS YELLOWSTONE
0080 065 G 02	LOCKWOOD PARK YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 066 F 05	COBURN ROAD, SOUTH OF BILLINGS MONTANA AIR QUALITY BUREAU	RURAL-NEAR URBAN SPECIAL STUDIES	BILLINGS YELLOWSTONE
0080 066 G 02	COBURN ROAD YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-NEAR URBAN SOURCE ORIENTED	BILLINGS YELLOWSTONE
0080 067 G 01	SANDSTONE SCHOOL, 1440 NUTTER BLVD YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL POPULATION ORIENTED	BILLINGS YELLOWSTONE

TABLE 1c

AQCR 140 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0840 [illegible]	LAUREL JUNIOR HIGH - 410 COLORADO AVE YELLOWSTONE COUNTY AIR POLLUTION CONTROL	CITY CENTER-RESIDENTIAL SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	ROADHOUSE ROAD - 1 MI NE OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-INDUSTRIAL SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	CITY SEW TRTMT PLANT - 3/4 MI W OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-NEAR URBAN SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	LAUREL WATER PLANT - 1/2 MI S OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-NEAR URBAN SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	WEST LAUREL CHURCH - 1/2 MI WNW OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	A & W ROOT BEER - 1/2 MI NNW OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-COMMERCIAL SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	EAST OF LAUREL - 3/4 MI NE OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-NEAR URBAN SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	FARM EAST OF CENEX - 3/8 MI NE OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-AGRICULTURAL SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	ROOTBEER STAND - 1 3/4 MI NE OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	SUBURBAN-COMMERCIAL SOURCE ORIENTED	LAUREL YELLOWSTONE
0840 [illegible]	WEST COOP - 1/4 MI WEST OF CENEX YELLOWSTONE COUNTY AIR POLLUTION CONTROL	RURAL-INDUSTRIAL SOURCE ORIENTED	LAUREL YELLOWSTONE

TABLE 2a

AQCR 140 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD	TP
0080 001 G 02	214 Pueblo Street	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 003 G 02	113 Bitterroot Drive	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 004 G 02	114 Johnson Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 006 G 02	Lockwood School	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 007 G 01	KGHL Station	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 008 G 01	City Hall	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 008 G 07	City Hall - Collocated	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0080 009 G 01	Grand Avenue School	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 010 G 02	Garden Avenue	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 011 G 02	33rd Street & 2nd Avenue N.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 014 G 02	Mountain View Boulevard	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 017 G 02	Minnesota Avenue	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 018 G 02	5th Street & South 20th	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 019 G 02	South 27tn & 11th Avenue S.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 021 G 02	East of Conoco	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 022 G 02	Two Moon Park	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 025 G 02	State Street & 3rd South	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0080 027 G 02	Newman School	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

TABLE 2b

AQCR 140 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD
0080 028 G 02	Bench School	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0080 032 G 02	Klenck Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0080 034 G 02	Piccolo & Frontage Road	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0080 037 F 05	Johnson and Lockwood	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0080 038 G 02	Johnson Road North	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0080 061 F 02	Metra - Fairgrounds	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1
0080 061 G 02	Metra - Fairgrounds	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0080 062 F 01	Taft School	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
0080 062 F 07	Taft School - Collocated	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0080 064 F 05	North Johnson Lane	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
0080 065 F 01	Lockwood Park	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
0080 065 G 02	Lockwood Park	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0080 066 F 06	Coburn Road	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
0080 066 G 02	Coburn Road	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0080 067 G 01	Sandstone School	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0840 001 G 02	Laurel Junior High	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0840 003 G 02	Roadhouse Road	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0840 004 G 02	City Sewage Treatment Plant	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0840 005 G 02	Laurel Water Plant	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

TABLE 2c

AQCR 140 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD	TP
0840 006 G 02	West Laurel Church	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0840 007 G 02	A & W Root Beer	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0840 008 G 02	East of Laurel	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0840 009 G 02	Farm East of Cenex	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0840 010 G 02	Root Beer Stand	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0840 013 G 02	West Coop	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

Key:

TSP - Total Suspended Particulates

B-S - Back Scatter (Visibility)

AS - Arsenic

CD - Cadmium

CU - Copper

PB - Lead

ZN - Zinc

F-P - Fluoride (Calcium Papers)

F-V - Fluoride (Vegetation)

NO_3 - Nitrate

SO_4 - Sulfate

CO - Carbon Monoxide

SO_2 - Sulfur Dioxide

S-R - Sulfation Rate

WS - Wind Speed

WD - Wind Direction

SD - Standard Deviation WD

TP - Temperature

TABLE 3a

AQCR 140 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Yellowstone/Billings								
0080 008 G 01	City Hall	82	55	153	109	107	65.4	59.9
		83	55	152	127	107	60.3	55.6
		84	58	143	133	131	69.5	63.3
0080 008 G 07	City Hall - Collocated	82	57	165	112	107	64.9	59.6
		83	52	153	127	106	62.3	58.3
		84	59	144	139	137	70.1	64.0
0080 009 G 01	Grand Avenue School	82	56	124	119	103	60.4	56.4
		83	53	148	143	131	57.2	51.4
		84	55	138	106	102	63.2	58.0
0080 062 F 01	Taft School	82	56	162	152	149	64.2	55.0
		83	56	217	207	203	67.0	56.3
		84	54	191	163	153	81.0	68.6
0080 062 F 07	Taft School - Collocated	82	57	174	142	141	63.3	53.9
		83	58	204	203	193	64.3	54.0
		84	56	171	162	145	74.4	63.8
0080 065 F 05	Lockwood Park	82	--	--	--	--	---	---
		83	21	293	186	148	75.9	60.1
		84	57	187	153	148	64.5	52.8

TABLE 3b

AQCR 140 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Yellowstone/Billings								
0080 067 G 01	Sandstone School	82	--	--	--	--	---	---
		83	47	76	61	54	31.2	27.9
		84	54	108	81	72	34.8	29.8
Yellowstone/Laurel								
0840 001 G 02	Laurel Junior High	82	55	77	74	73	37.6	33.8
		83	53	81	59	59	37.8	35.0
		84	55	107	92	76	41.9	37.0

TABLE 4a

AQCR 140 - CARBON MONOXIDE

Parts Per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	8 Hr Max	Monthly Average
0080 061 F 02	Metra - Fairgrounds	82	01	738	17.5	11.2	6.8	5.2	1.5
			02	583	10.9	9.1	8.4	5.3	2.0
			03	737	8.7	8.1	7.1	4.7	1.8
			04	539	12.1	4.2	4.1	3.3	1.3
			05	175	3.0	2.5	2.5	1.8	1.0
			06	659	9.0	8.3	5.0	2.9	1.2
			07	705	10.0	5.0	4.5	3.3	1.2
			08	565	5.2	4.9	4.0	2.5	1.0
			09	684	14.3	10.2	7.5	3.6	1.1
			10	737	9.9	9.9	8.7	5.4	1.6
			11	431	11.5	10.5	10.5	7.3	1.8
			12	---	---	---	---	---	---
		ANNUAL		6553	17.5	14.3	12.1	7.3	---
0080 061 F 02	Metra - Fairgrounds	83	01	680	23.9	11.2	10.9	9.8	1.9
			02	668	12.8	12.0	10.9	6.0	1.9
			03	513	12.9	11.8	8.7	6.9	1.2
			04	704	3.4	3.0	2.9	2.0	.7
			05	737	4.3	3.3	3.2	2.5	.9
			06	281	3.4	2.4	2.3	1.5	.9
			07	---	---	---	---	---	---
			08	---	---	---	---	---	---
			09	---	---	---	---	---	---
			10	435	12.6	9.7	7.6	5.9	1.7
			11	711	20.0	13.5	8.0	5.7	1.1
			12	406	8.3	7.8	7.1	4.9	1.2
		ANNUAL		5135	23.9	20.0	13.5	9.8	---

TABLE 4b

AQCR 140 - CARBON MONOXIDE

Parts Per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	8 Hr Max	Monthly Average
0080 061 G 02	Metra - Fairgrounds	84	01	---	---	---	---	---	---
			02	152	6.1	5.7	4.5	2.6	1.0
			03	272	5.8	5.4	4.2	2.6	0.8
			04	---	---	---	---	---	---
			05	102	3.5	3.3	2.2	1.6	0.7
			06	151	4.0	4.0	2.8	1.4	0.4
			07	---	---	---	---	---	---
			08	139	1.0	0.8	0.8	0.6	0.1
			09	216	5.7	3.4	3.4	2.9	1.2
			10	654	11.1	8.7	7.7	5.1	0.9
			11	715	6.3	6.0	5.8	4.6	1.3
			12	705	8.0	7.8	7.7	7.0	1.4
		ANNUAL		3106	11.1	8.7	8.0	7.0	---

TABLE 5a

AQCR 140 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0080 064 F 05	North Johnson Lane	82	01	728	.381	.328	.326	.353	.111	.021
			02	619	.355	.335	.330	.230	.131	.037
			03	693	.216	.191	.163	.168	.058	.014
			04	655	.304	.210	.170	.175	.048	.012
			05	730	.220	.189	.175	.194	.035	.008
			06	700	.210	.190	.175	.166	.035	.011
			07	683	.325	.266	.247	.235	.051	.014
			08	722	.425	.277	.250	.226	.056	.021
			09	549	.716	.340	.320	.517	.065	.025
			10	549	.384	.320	.294	.277	.096	.028
			11	714	.250	.237	.232	.206	.102	.029
			12	734	.364	.295	.269	.309	.099	.029
		ANNUAL		8076	.716	.425	.384	.517	.131	.020
0080 064 F 05	North Johnson Lane	83	01	737	.375	.363	.338	.263	.119	.040
			02	668	.374	.324	.306	.262	.083	.030
			03	678	.357	.310	.299	.259	.049	.013
			04	708	.458	.262	.215	.261	.046	.007
			05	483	.203	.192	.156	.138	.052	.012
			06	---	---	---	---	---	---	---
			07	---	---	---	---	---	---	---
			08	---	---	---	---	---	---	---
			09	---	---	---	---	---	---	---
			10	348	.253	.217	.208	.181	.092	.037
			11	716	.317	.271	.266	.213	.112	.029
			12	604	.392	.364	.353	.301	.120	.032
		ANNUAL		4942	.458	.392	.375	.301	.120	.024

TABLE 5b

AQCR 140 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0080 064 F 05	North Johnson Lane	84	01	722	.233	.233	.226	.211	.088	.025
			02	687	.256	.219	.196	.190	.067	.020
			03	724	.160	.159	.158	.136	.042	.008
			04	329	.135	.110	.070	.097	.018	.003
			05	519	.425	.228	.210	.248	.053	.011
			06	331	.170	.135	.130	.119	.031	.009
			07	57	.107	.068	.068	.055	.024	.015
			08	665	.287	.268	.250	.207	.048	.021
			09	710	.520	.425	.400	.448	.118	.015
			10	61	.300	.250	.210	.233	.094	.062
			11	---	---	---	---	---	---	---
			12	529	.460	.315	.310	.333	.098	.035
		ANNUAL		5334	.520	.460	.425	.448	.118	.018

TABLE 5c

AQCR 140 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0080 065 F 05	Lockwood Park	82	01	733	.267	.261	.257	.223	.139	.026
			02	663	.228	.227	.210	.170	.077	.034
			03	724	.260	.250	.232	.162	.075	.019
			04	593	.657	.623	.520	.600	.109	.020
			05	733	.322	.230	.200	.200	.051	.014
			06	596	.284	.227	.224	.238	.067	.015
			07	563	.287	.222	.200	.187	.080	.017
			08	716	.243	.242	.239	.200	.067	.024
			09	601	.324	.248	.205	.210	.063	.023
			10	632	.278	.257	.252	.230	.062	.024
			11	713	.235	.234	.218	.188	.059	.026
			12	739	.663	.542	.411	.483	.173	.036
		ANNUAL		8106	.663	.657	.623	.600	.173	.023
0080 065 F 05	Lockwood Park	83	01	736	.468	.323	.252	.281	.130	.033
			02	559	.562	.490	.438	.380	.104	.032
			03	738	.500	.388	.354	.344	.103	.021
			04	700	.347	.326	.233	.198	.068	.019
			05	735	.277	.183	.177	.155	.056	.021
			06	676	.442	.361	.265	.325	.116	.029
			07	731	.360	.302	.290	.233	.070	.031
			08	733	.401	.388	.369	.317	.103	.036
			09	632	.527	.460	.410	.392	.095	.035
			10	431	.332	.215	.202	.169	.062	.033
			11	712	.248	.189	.185	.172	.091	.028
			12	567	.175	.175	.174	.157	.087	.038
		ANNUAL		7950	.562	.527	.500	.392	.130	.029

TABLE 5d

AQCR 140 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0080 065 F 01	Lockwood Park	84	01	734	.207	.182	.170	.171	.089	.042
			02	683	.214	.182	.148	.180	.068	.020
			03	701	.225	.151	.149	.146	.038	.015
			04	716	.266	.173	.170	.134	.093	.013
			05	566	.293	.253	.199	.212	.039	.014
			06	547	.219	.177	.146	.144	.046	.013
			07	---	---	---	---	---	---	---
			08	459	.322	.311	.255	.180	.066	.029
			09	702	.378	.271	.222	.197	.067	.025
			10	59	.328	.306	.212	.277	.110	.060
			11	84	.089	.056	.054	.054	.025	.017
			12	717	.550	.400	.210	.293	.067	.029
		ANNUAL		5968	.550	.400	.378	.293	.110	.023

TABLE 5e

AQCR 140 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0080 066 F 05	Coburn Road	82	01	728	.409	.392	.359	.314	.155	.052
			02	601	.342	.265	.231	.187	.098	.043
			03	630	.263	.242	.217	.240	.071	.024
			04	634	.310	.275	.220	.261	.052	.013
			05	649	.210	.115	.111	.095	.021	.007
			06	707	.150	.131	.113	.111	.035	.011
			07	733	.227	.195	.169	.135	.050	.012
			08	734	.385	.307	.270	.202	.072	.028
			09	528	.335	.275	.275	.288	.074	.026
			10	448	.331	.223	.184	.231	.072	.033
			11	151	.213	.176	.149	.127	.073	.051
			12	734	.541	.373	.360	.397	.140	.040
		ANNUAL		7277	.541	.409	.392	.397	.155	.026
0080 066 F 05	Coburn Road	83	01	739	.778	.697	.581	.650	.222	.051
			02	668	.345	.334	.275	.211	.087	.036
			03	704	.449	.357	.249	.296	.086	.017
			04	706	.263	.230	.209	.180	.050	.012
			05	733	.229	.222	.217	.140	.050	.011
			06	713	.398	.312	.207	.206	.045	.010
			07	568	.195	.192	.169	.157	.064	.022
			08	525	.333	.286	.267	.251	.076	.036
			09	709	.422	.417	.308	.315	.119	.032
			10	576	.399	.365	.362	.341	.070	.024
			11	646	.201	.199	.184	.150	.086	.038
			12	570	.321	.243	.236	.206	.108	.047
		ANNUAL		7857	.778	.697	.581	.650	.222	.027

TABLE 5f

AQCR 140 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0080 066 F 05	Coburn Road	84	01	734	.220	.212	.208	.210	.088	.035
			02	174	.145	.126	.099	.088	.037	.014
			03	633	.310	.134	.131	.123	.038	.011
			04	712	.279	.196	.195	.201	.042	.012
			05	366	.218	.140	.129	.109	.029	.013
			06	158	.293	.198	.141	.178	.038	.020
			07	---	---	---	---	---	---	---
			08	571	.372	.268	.227	.187	.069	.030
			09	712	.362	.237	.198	.207	.073	.027
			10	85	.350	.310	.300	.300	.121	.076
			11	---	---	---	---	---	---	---
			12	464	.438	.418	.282	.224	.120	.052
		ANNUAL		4609	.438	.418	.372	.300	.121	.026

TABLE 6a

AQCR 140 - SULFATION RATE

Milligrams Sulfur Trioxide per 100 Square Centimeters per Day

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Yellowstone/Billings							
0080 001 G 02	214 Pueblo Street	82	--	--	--	--	--
		83	--	--	--	--	--
		84	12	.68	.35	.34	.20
0080 003 G 02	Bitterroot	82	12	.56	.47	.40	.28
		83	12	.53	.52	.50	.35
		84	12	.82	.49	.42	.36
0080 004 G 02	Johnson Lane	82	12	1.09	.82	.71	.51
		83	11	1.19	1.03	.79	.57
		84	12	1.25	1.09	.94	.70
0080 006 G 02	Lockwood School	82	12	1.16	1.15	1.11	.61
		83	12	1.08	.99	.89	.68
		84	12	1.25	1.07	.94	.73
0080 007 G 01	KGHL Station	82	12	.96	.55	.53	.36
		83	12	.85	.55	.45	.37
		84	11	.81	.48	.46	.28
0080 008 G 01	City Hall	82	12	.47	.38	.31	.21
		83	12	.69	.45	.39	.36
		84	12	.56	.50	.39	.24
0080 009 G 01	Grand Avenue School	82	12	.59	.39	.28	.21
		83	12	.62	.25	.22	.36
		84	12	.61	.40	.35	.21

TABLE 6b

AQCR 140 - SULFATION RATE

Milligrams Sulfur Trioxide per 100 Square Centimeters per Day

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Yellowstone/Billings							
0080 010 G 02	Garden Avenue	82	12	.35	.33	.30	.20
		83	12	.55	.27	.25	.21
		84	12	.36	.28	.19	.13
0080 011 G 02	33rd Street & 2nd Avenue North	82	12	.37	.28	.21	.15
		83	12	.51	.32	.28	.19
		84	12	.45	.36	.26	.17
0080 014 G 02	Mountain View Boulevard	82	12	.31	.30	.23	.16
		83	12	.58	.41	.24	.19
		84	12	.56	.45	.29	.20
0080 017 G 02	Minnesota Avenue	82	12	.82	.71	.63	.45
		83	12	.88	.67	.66	.46
		84	12	.86	.79	.78	.47
0080 018 G 02	5th Street & South 28th	82	11	.67	.56	.48	.35
		83	12	.69	.50	.36	.32
		84	12	.55	.51	.45	.30
0080 019 G 02	South 27th & 11th Avenue South	82	10	1.05	.94	.53	.51
		83	12	1.10	.69	.67	.50
		84	12	.88	.71	.60	.45
0080 021 G 02	East of Conoco	82	11	1.32	1.09	.61	.59
		83	12	.99	.86	.67	.53
		84	12	1.20	.97	.73	.57

TABLE 6c

AQCR 140 - SULFATION RATE

Milligrams Sulfur Trioxide per 100 Square Centimeters per Day

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Yellowstone/Billings							
0080 022 G 02	Two Moon Park	82	12	1.34	1.17	1.09	.67
		83	12	1.43	1.22	.91	.74
		84	12	1.57	1.23	.86	.73
0080 025 G 02	State Street & 3rd South	82	--	--	--	--	--
		83	--	--	--	--	--
		84	12	.79	.60	.48	.37
0080 027 G 02	Newman School	82	11	.53	.48	.47	.26
		83	11	.68	.49	.44	.32
		84	12	.71	.56	.31	.25
0080 028 G 02	Bench School	82	12	.36	.33	.26	.18
		83	12	.57	.38	.36	.24
		84	12	.69	.49	.44	.28
0080 032 G 02	Klenck Lane	82	12	1.27	1.22	1.19	.64
		83	12	1.28	.99	.95	.63
		84	12	1.29	1.08	.88	.64
0080 034 G 02	Piccolo and Frontage Road	82	12	1.58	1.38	1.34	1.14
		83	12	1.54	1.41	1.08	.98
		84	12	1.79	1.45	1.33	1.02
0080 037 G 02	Johnson and Lockwood	82	12	1.46	1.41	1.40	.79
		83	11	1.90	1.71	1.21	.94
		84	12	2.43	1.38	1.04	.96

TABLE 6d

AQCR 140 - SULFATION RATE

Milligrams Sulfur Trioxide per 100 Square Centimeters per Day

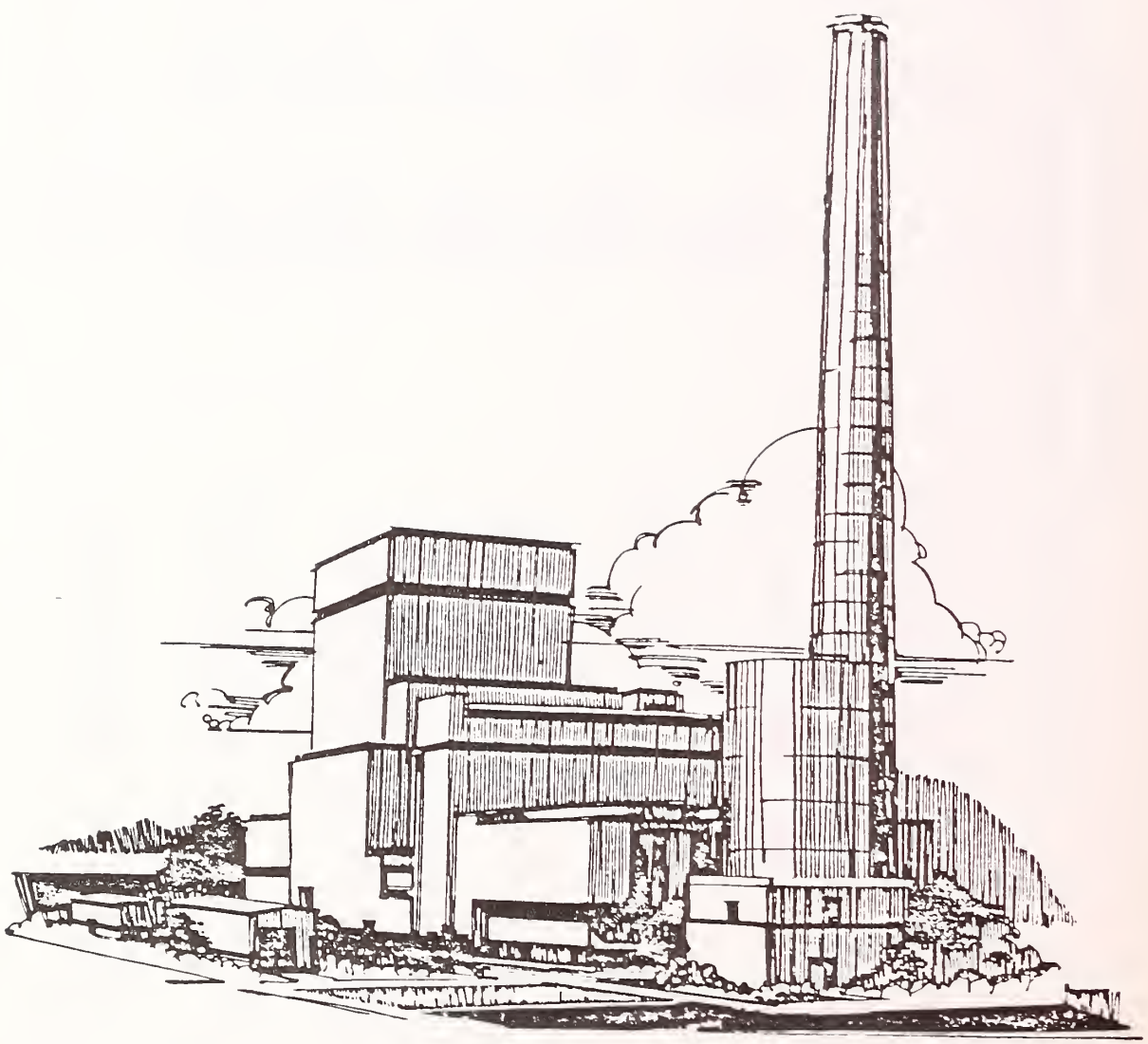
County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Yellowstone/Billings							
0080 038 G 02	Johnson Road North	82	12	1.46	1.38	1.15	.83
		83	12	1.60	1.58	1.39	.91
		84	12	2.43	1.44	1.41	1.12
0080 061 G 02	Metra Parking Lot	84	11	.75	.62	.59	.38
0080 065 G 02	Lockwood Park	84	12	1.37	.96	.89	.73
0080 066 G 02	Coburn Road	84	12	2.15	1.62	1.55	1.02
0080 067 G 02	Sandstone School	84	8	.49	.32	.24	.18
Yellowstone/Laurel							
0840 001 G 02	Laurel Junior High	82	10	.43	.17	.09	.10
		83	12	.50	.16	.16	.11
		84	12	.23	.21	.20	.08
0840 003 G 02	Roadhouse Road	82	12	1.03	.81	.65	.43
		83	12	1.05	1.04	.73	.48
		84	12	1.49	.96	.86	.55
0840 004 G 02	City Sewage Treatment Plant	82	12	.69	.67	.61	.48
		83	8	.88	.64	.54	.51
		84	12	.64	.60	.58	.48

TABLE 6e

AQCR 140 - SULFATION RATE

Milligrams Sulfur Trioxide per 100 Square Centimeters per Day

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Yellowstone/Laurel							
0840 005 G 02	Laurel Water Plant	82	12	.64	.62	.61	.42
		83	12	.66	.62	.59	.43
		84	12	.67	.66	.65	.49
0840 006 G 02	West Laurel Church	82	10	.43	.22	.17	.13
		83	12	.52	.20	.20	.17
		84	12	.27	.26	.22	.14
0840 007 G 02	A & W Root Beer	82	--	--	--	--	--
		83	--	--	--	--	--
		84	12	.29	.26	.23	.11
0840 008 G 02	East of Laurel	82	12	1.35	1.04	.92	.65
		83	12	1.76	1.25	.86	.72
		84	12	2.42	1.29	1.14	.89
0840 009 G 02	Farm East of CENEX	82	10	1.51	1.16	.99	.77
		83	11	2.00	1.60	1.37	.90
		84	12	2.74	1.46	1.06	1.03
0840 010 G 02	Root Beer Stand	82	--	--	--	--	--
		83	--	--	--	--	--
		84	12	1.52	.93	.62	.52
0840 013 G 02	West Coop	82	9	.26	.24	.18	.15
		83	11	.46	.32	.23	.19
		84	12	.31	.24	.24	.15



AQCR 141

INTRODUCTION

This section deals with the air monitoring activities and pollution concerns in AQCR 141.

LOCATION AND PHYSICAL FEATURES

AQCR 141 is located in north central Montana. Glaciated plain is the main physical feature. There are some foothills and mountainous areas along the western edge (Continental Divide) and south of Havre (Bearpaw Mountains).

The Missouri River flows from west to east in the southern portion of the region. Several other tributary rivers of the Missouri also flow from west to east in the region. Figure 2 shows a regional map.

POPULATION

The population of AQCR 141 is 146,600 (1984 estimate) or 17.8 percent of the state population. The majority of the people in the region live in Cascade County (Great Falls).

POLLUTION SOURCES

Pollution sources and types of pollutants are listed for each county in the region. A final category lists the types of sources that would be expected in all counties in the region. The sources by county are as follows:

Cascade County

Several grain processing and feed mills (particulates)
Oil refinery (particulates, SO_2, NOx, CO, VOC)
Vermiculite manufacturing (particulates)

Glacier County

Two gas sweetening plants (SO_2, NOx)
Oil refinery (SO_2, NOx, CO)

All Counties

Asphalt plants (particulates)
Gravel crushers (particulates)
Home heating devices (particulates, CO)
Automobiles (CO, NOx, re-entrained particulates)
Agricultural activities (particulates)
Wind erosion (particulates)

MONITORING SITE DESCRIPTIONS

A number of monitoring sites were in operation during 1984. Table 7 lists the monitoring site descriptions. This includes site codes, site name, supporting agency, station type, project description, city name and county name.

Table 8 gives an inventory of pollutants and wind parameters measured at each site.

DATA SUMMARY

Total Suspended Particulates

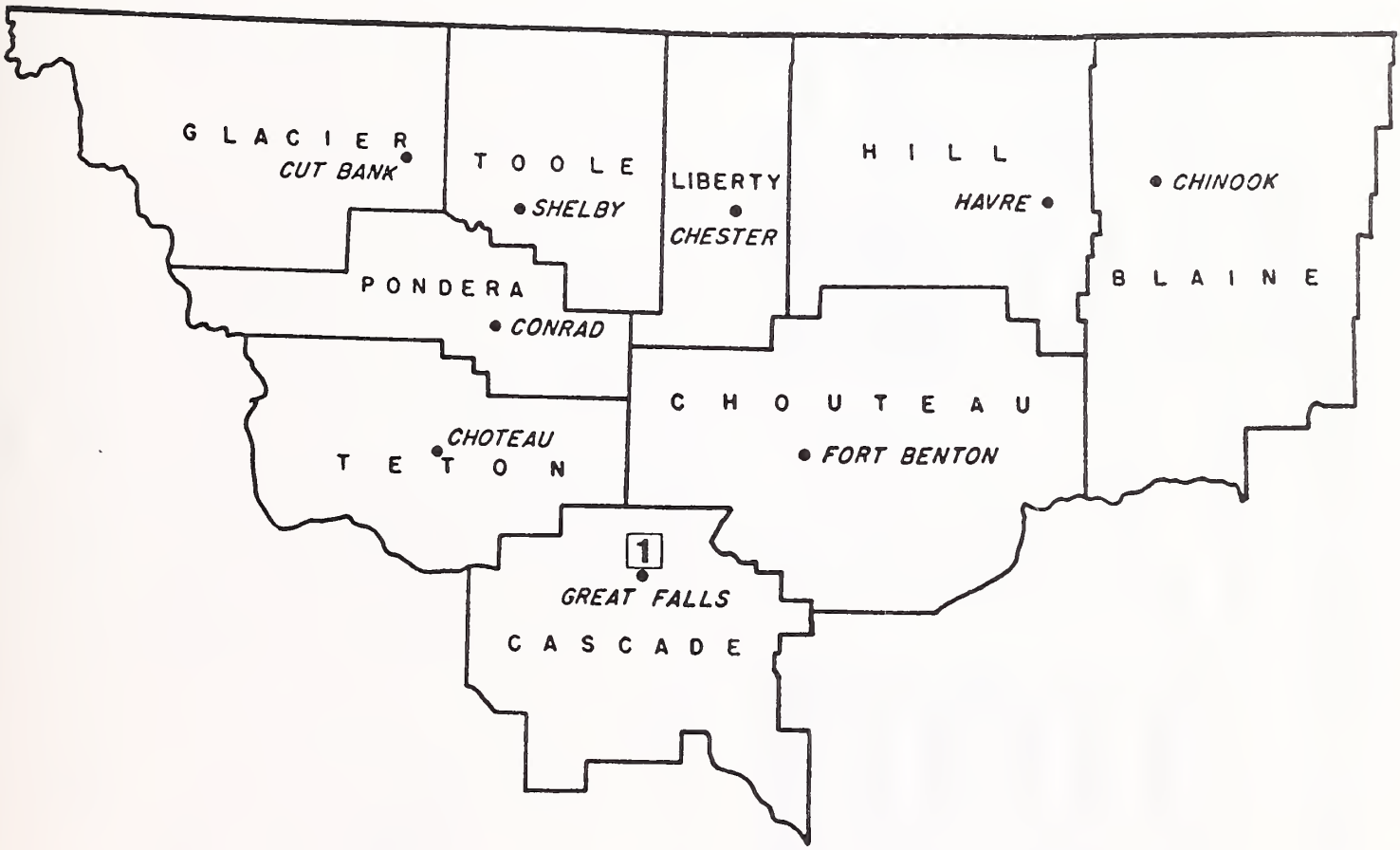
TSP was monitored at four sites in this region in 1984. One of the sites was collocated. The maximum 24-hour observation was 175 ug/m^3 at both the Black Eagle PO site and the Fire Station #1 site. The highest annual geometric average was 63.3 ug/m^3 at the Fire Station #1 site. There were no violations of any primary TSP standards. Table 9 summarizes the TSP data for this region.

Carbon Monoxide

Carbon monoxide was monitored at one locations (Pardis Clinic) in this region. The maximum one hour observation was 18.8 ppm. The maximum eight hour observation was 14.5 ppm. There were no violations of the one hour standard or the eight hour standard. Table 10 summarizes the CO data for this region.

FIGURE

AQCR 141 - REGION MAP



MONITORING SITE LOCATIONS

1. Great Falls

TABLE 7
AQCR 141 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0660 009 G 01	FIRE STATION #1 - 9TH ST & 1ST AVE SOUTH CASCADE COUNTY HEALTH DEPARTMENT	CITY CENTER - RESIDENTIAL POPULATION ORIENTED	GREAT FALLS CASCADE
0660 017 G 01	DOWNTOWN (WEST) - 301 2ND AVE N CASCADE COUNTY HEALTH DEPARTMENT	CITY CENTER - COMMERCIAL POPULATION ORIENTED	GREAT FALLS CASCADE
0660 017 G 07	DOWNTOWN (EAST) - 301 2ND AVE N CASCADE COUNTY HEALTH DEPARTMENT	CITY CENTER - COMMERCIAL QA-COLOCATED SAMPLER	GREAT FALLS CASCADE
0660 019 G 01	BLACK EAGLE PO - 1321 SMELTER AVE CASCADE COUNTY HEALTH DEPARTMENT	CITY CENTER - COMMERCIAL POPULATION ORIENTED	GREAT FALLS CASCADE
0660 022 G 01	FRANKLIN SCHOOL - 813 2ND AVE SW CASCADE COUNTY HEALTH DEPARTMENT	CITY CENTER - RESIDENTIAL POPULATION ORIENTED	GREAT FALLS CASCADE
0660 023 G 02	PARDIS CLINIC - 826 10TH AVE SOUTH CASCADE COUNTY HEALTH DEPARTMENT	CITY CENTER - COMMERCIAL SOURCE ORIENTED	GREAT FALLS CASCADE

TABLE 8

AQCR 141 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD	TP
0660 009 G 01	Fire Station #1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0660 017 G 01	Downtown	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0660 017 G 07	Downtown - Collocated	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0660 019 G 01	Black Eagle Post Office	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0660 022 G 01	Franklin School	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0660 023 G 02	Pardis Clinic	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0

Key:

TSP - Total Suspended Particulates

B-S - Back Scatter (Visibility)

AS - Arsenic

CD - Cadmium

CU - Copper

PB - Lead

ZN - Zinc

F-P - Fluoride (Calcium Papers)

F-V - Fluoride (Vegetation)

NO_3 - Nitrate

SO_4 - Sulfate

CO - Carbon Monoxide

SO_2 - Sulfur Dioxide

S-R - Sulfation Rate

WS - Wind Speed

WD - Wind Direction

SD - Standard Deviation WD

TP - Temperature

TABLE 9

AQCR 141 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Cascade/Great Falls								
0660 009 G 01	Fire Station #1	82	52	204	179	158	78.5	67.1
		83	57	163	112	105	55.2	49.6
		84	59	175	174	165	71.9	63.3
0660 017 G 01	Downtown	82	50	107	106	105	54.2	48.7
		83	57	108	105	87	46.7	42.2
		84	51	120	93	89	50.9	45.8
0660 017 G 01	Downtown - Collocated	82	55	104	104	93	52.5	47.4
		83	60	110	89	88	47.0	42.4
		84	61	116	115	96	51.0	45.3
0660 019 G 01	Black Eagle PO	82	60	216	144	140	73.3	65.5
		83	58	201	171	128	63.4	55.6
		84	59	175	134	130	63.9	55.9
0660 022 G 01	Franklin School	82	--	--	--	--	---	---
		83	48	104	91	74	46.8	42.9
		84	19	78	70	62	41.1	34.3

TABLE 10

AQCR 141 - CARBON MONOXIDE

Parts Per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	8 Hr Max	Monthly Average
0660 023 G 02	Pardis Clinic	83	01	---	---	---	---	---	---
			02	---	---	---	---	---	---
			03	---	---	---	---	---	---
			04	---	---	---	---	---	---
			05	---	---	---	---	---	---
			06	---	---	---	---	---	---
			07	---	---	---	---	---	---
			08	---	---	---	---	---	---
			09	---	---	---	---	---	---
			10	---	---	---	---	---	---
			11	500	9.0	8.7	8.3	10.3	1.6
			12	742	20.3	16.9	16.6	6.7	2.6
		ANNUAL		1242	20.3	16.9	16.6	10.3	---
		84	01	691	9.4	7.9	7.8	5.5	1.1
			02	653	18.8	18.0	17.0	14.5	1.1
			03	738	8.7	7.0	6.9	6.6	1.8
			04	626	5.6	5.5	5.4	4.6	1.3
			05	740	6.7	5.0	3.8	3.1	0.8
			06	594	9.2	7.9	5.9	4.0	1.0
			07	736	6.9	6.4	6.3	4.4	1.3
			08	680	10.0	9.0	6.6	5.8	1.6
			09	554	8.8	6.2	5.6	4.6	1.4
			10	736	8.8	8.3	7.4	4.6	1.4
			11	716	10.6	9.0	9.0	6.3	1.1
			12	361	12.7	12.5	12.3	8.0	2.2
		ANNUAL		7825	18.8	18.0	17.0	14.5	---

AQCR 142

INTRODUCTION

This section deals with the air monitoring activities and pollution concerns in AQCR 142.

LOCATION AND PHYSICAL FEATURES

AQCR 142 is located in the southwest corner of the state. The Continental Divide borders the southern edge of the region and then cuts up through the northern portion. The region contains several distinct mountain ranges separated by fairly wide valleys. Tributaries for the Missouri, Clark Fork and Yellowstone Rivers have their beginnings in this area. Figure 3 shows a regional map.

POPULATION

The population of AQCR 142 is 191,000 (1984 estimate) or 23.2 percent of the state population. The main population centers in the region are in Lewis & Clark County (Helena), Gallatin County (Bozeman), and Silver Bow County (Butte).

POLLUTION SOURCES

Pollution sources and types of pollutants are listed for each county in the region. A final category lists the types of sources that would be expected in all counties in the region. The sources by county are as follows:

Beaverhead County

- Sawmill (particulates)
- Talc production (particulates)

Broadwater County

- Sawmill (particulates)
- Lime production (particulates)

Deer Lodge County

- Iron casting (particulates)
- Smelter demolition (particulates, metals)

Gallatin County

- Ethanol plant (particulates, SO_2, NOx, CO)
- Cement production (particulates)
- Talc production (particulates)
- Sawmill (particulates)

Granite County

- Sawmill (particulates)

Jefferson County

- Cement production (particulates)
- Gold mining (particulates)

Lewis & Clark County

- Primary lead smelter (particulates, SO_2, lead)
- Paint pigment manufacturing (particulates, SO_2, VOC, metals)

Madison County

- Talc mining (particulates)

Park County

- Solid waste incinerator (particulates)
- Several sawmills (particulates, CO)

Silver Bow County

- Elemental phosphorus manufacturing (particulates, fluoride)
- Open pit copper mine (particulates) -- curtailed

All Counties

- Asphalt plants (particulates)
- Gravel crushers (particulates)
- Home heating devices (particulates, CO)
- Automobiles (CO, NOx, re-entrained particulates)
- Agricultural activity (particulates)
- Wind erosion (particulates)

MONITORING SITE DESCRIPTIONS

A number of monitoring sites were in operation during 1984. Table 11 lists the monitoring site descriptions. This includes site codes, site name, supporting agency, station type, project description, city name and county name.

Table 12 gives an inventory of pollutants and wind parameters measured at each site.

DATA SUMMARY

Total Suspended Particulates

TSP was monitored at seventeen sites in this region. Two of the sites were collocated. The maximum 24-hour observation was 825 ug/m^3 at the Hiway Junction site in Anaconda. The highest valid annual geometric average was 70.2 ug/m^3 at the Hadfield site in East Helena. Two sites had violations of the federal primary 24-hour standard: the Hiway Junction site in Anaconda and the Hadfield site in East Helena. There were no violations of the federal annual primary standard. Four sites had violations of the Montana 24-hour standard: Hiway Junction, Montana City, Fire Hall, and Hadfield. Two sites had violations of the Montana annual standard: Fire Hall and Hadfield. Table 13 summarizes the TSP data for this region.

Aluminum

Aluminum was analyzed from hi-vol filters at one site (Hiway Junction) in this region. The maximum 24-hour observation was 7.03 ug/m^3. There is no air pollution standard for aluminum. Table 14 summarizes the aluminum data for this region.

Arsenic

Arsenic was analyzed from hi-vol filters at six sites in this region. One of the sites was collocated. The maximum 24-hour observation was 1.657 ug/m^3 at

the Firehall site in East Helena. There is no air pollution standard for arsenic. Table 15 summarizes the arsenic data for this region.

Cadmium

Cadmium was analyzed from hi-vol filters at six sites in this region. One of the sites was collocated. The maximum 24-hour observation was 1.695 ug/m^3 at the Hadfield site in East Helena. There is no air pollution standard for cadmium. Table 16 summarizes the cadmium data for this region.

Chromium

Chromium was analyzed from hi-vol filters at one site (Hiway Junction) in this region. The maximum 24-hour observation was 0.03 ug/m^3. There is no air pollution standard for chromium. Table 17 summarizes the chromium data for this region.

Copper

Copper was analyzed from hi-vol filters at six sites in this region. One of the sites was collocated. The maximum 24-hour observation was 102.9 ug/m^3 at the Hadfield site in East Helena. There is no air pollution standard for copper. Table 18 summarizes the copper data for this region.

Lead

Lead was analyzed from hi-vol filters at eight sites in this region. One of the sites was collocated. The maximum 24-hour observation was 19.27 ug/m^3 at the Firehall site in East Helena. The highest quarterly average was 6.82 ug/m^3 at the Firehall site in East Helena. There were fifteen violations of the Federal calendar quarter standard. Table 19 summarizes the daily lead data for this region; Table 20 summarizes the quarterly lead data.

Zinc

Zinc was analyzed from hi-vol filters at six sites in this region. One of the sites was collocated. The maximum 24-hour observation was 114.8 ug/m^3 at the Hadfield site in East Helena. There is no air pollution standard for zinc. Table 19 summarizes the zinc data for this region.

Fluoride

Fluoride in vegetation was measured at five sites in this region. The maximum monthly average was 133.5 ug/g at the #6 Hilderman site. The highest grazing season average was 54.9 ug/g also at the #6 Hilderman site. There were six violations of the monthly Montana Foliar Fluoride standard and two violations of the grazing season standard. Table 22 summarizes the fluoride data for this region.

FIGURE

AQCR 142 - REGION MAP

MONITORING SITE LOCATIONS

1. Anaconda
2. Bozeman
3. Butte
4. Deer Lodge
5. Dillon
6. East Helena
7. Helena
8. Ovando

TABLE 11a
AQCR 142 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0020 007 F 01	LINCOLN SCHOOL, CEDAR STREET MONTANA AIR QUALITY BUREAU	SUBURBAN - RESIDENTIAL POPULATION ORIENTED	ANACONDA DEER LODGE
0120 002 F 01	EAST MAIN CITY BUILDING MONTANA AIR QUALITY BUREAU	CITY CENTER - COMMERCIAL POPULATION ORIENTED	BOZEMAN GALLATIN
0120 005 F 01	WHITTIER SCHOOL, 515 N 5TH AVENUE MONTANA AIR QUALITY BUREAU	SUBURBAN - RESIDENTIAL POPULATION ORIENTED	BOZEMAN GALLATIN
0160 005 F 01	GREELEY SCHOOL #1, SILVER BOW BLVD MONTANA AIR QUALITY BUREAU	CITY CENTER - RESIDENTIAL POPULATION ORIENTED	BUTTE SILVER BOW
0160 005 F 07	GREELEY SCHOOL #2 (COLOCATED HIVOL) MONTANA AIR QUALITY BUREAU	CITY CENTER - RESIDENTIAL QA-COLOCATED SAMPLER	BUTTE SILVER BOW
0380 001 F 01	POWELL COUNTY COURTHOUSE, MISSOURI STREET MONTANA AIR QUALITY BUREAU	CITY CENTER - COMMERCIAL POPULATION ORIENTED	DEER LODGE POWELL
0400 004 F 02	HIWAY JUNCTION, EAST OF ANACONDA MONTANA AIR QUALITY BUREAU	RURAL - AGRICULTURAL SOURCE ORIENTED	DEER LODGE
0400 041 F 02	#15 PETERSON, 1 MILE NORTH OF FAIRMONT MONTANA AIR QUALITY BUREAU	REMOTE SOURCE ORIENTED	RAMSAY DEER LODGE
0420 001 F 01	BEAVERHEAD CO COURTHOUSE ROOF, PENDOY ST MONTANA AIR QUALITY BUREAU	CITY CENTER - COMMERCIAL POPULATION ORIENTED	DILLON BEAVERHEAD
0720 001 F 01	COGSWELL BLDG #1 - LOCKEY AV & ROBERTS ST MONTANA AIR QUALITY BUREAU	CITY CENTER - RESIDENTIAL POPULATION ORIENTED	HELENA LEWIS & CLARK
0720 013 G 05	CAPITAL COURTS - 1013 DEARBORN AVE MONTANA AIR QUALITY BUREAU	SUBURBAN - COMMERCIAL SPECIAL STUDIES	HELENA LEWIS & CLARK
0720 016 G 05	COONEY HOME - 3404 COONEY DRIVE MONTANA AIR QUALITY BUREAU	SUBURBAN - RESIDENTIAL SPECIAL STUDIES	HELENA LEWIS & CLARK
0760 905 F 05	MONTANA CITY SCHOOL MONTANA AIR QUALITY BUREAU	CITY CENTER - RESIDENTIAL SPECIAL STUDIES	MONTANA CITY JEFFERSON
0860 002 F 02	HASTIE RESIDENCE - 212 PACIFIC ST MONTANA AIR QUALITY BUREAU	SUBURBAN - INDUSTRIAL SOURCE ORIENTED	EAST HELENA LEWIS & CLARK
0860 714 F 02	FIREHALL - 2 EAST PACIFIC ST MONTANA AIR QUALITY BUREAU	CITY CENTER - RESIDENTIAL SOURCE ORIENTED	EAST HELENA LEWIS & CLARK
0860 716 F 02	SOUTH - 3/4 MI S OF E HELENA - KLEF FIELD MONTANA AIR QUALITY BUREAU	SUBURBAN - INDUSTRIAL SOURCE ORIENTED	EAST HELENA LEWIS & CLARK

TABLE 11b
AQCR 142 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0860 719 F 02	HADFIELD - 101 WEST MAIN MONTANA AIR QUALITY BUREAU	SURBURBAN - INDUSTRIAL SOURCE ORIENTED	EAST HELENA LEWIS & CLARK
0860 719 F 07	HADFIELD - COLOCATED MONTANA AIR QUALITY BUREAU	SURBURBAN - INDUSTRIAL QA-COLOCATED SAMPLER	EAST HELENA LEWIS & CLARK
0860 724 F 02	DARTMAN FIELD - N OF EAST HELENA MONTANA AIR QUALITY BUREAU	RURAL - AGRICULTURAL SOURCE ORIENTED	EAST HELENA LEWIS & CLARK
1260 024 F 03	TERRY SMITH RANCH - 5 MI E OF OVANDO MONTANA AIR QUALITY BUREAU	RURAL - AGRICULTURAL BACKGROUND	OVANDO POWELL
1480 020 F 02	#3 OELAND - 1.25 MI SW OF RAMSAY - SEC 22 MONTANA AIR QUALITY BUREAU	RURAL - AGRICULTURAL SOURCE ORIENTED	RAMSAY SILVER BOW
1480 023 F 02	#6 HILDEBRAN - .25 MI W OF RAMSAY - S14 MONTANA AIR QUALITY BUREAU	RURAL - AGRICULTURAL SOURCE ORIENTED	RAMSAY SILVER BOW
1480 024 F 02	#7 TAMIETTI - 1 MI NW OF RAMSAY - SEC 15 MONTANA AIR QUALITY BUREAU	RURAL - AGRICULTURAL SOURCE ORIENTED	RAMSAY SILVER BOW
1480 029 F 02	#16 CRADDOCK - 4.5 MI NW OF RAMSAY MONTANA AIR QUALITY BUREAU	RURAL - AGRICULTURAL SOURCE ORIENTED	RAMSAY SILVER BOW

TABLE 12a

AQCR 142 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD	TP
0420 001 F 01	Beaverhead Co. Courthouse	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0020 007 F 01	Lincoln School	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0400 004 F 02	Hiway Junction*	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0400 041 F 02	#15 Peterson	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0120 002 F 01	East Main City Building	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0120 005 F 01	Whittier School	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0760 905 F 05	Montana City School	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0720 001 F 01	Cogswell Building	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0720 013 G 05	Capital Courts	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0720 016 G 05	Cooney Home	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0860 002 F 02	Hastie Residence	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0860 714 F 02	Fire Hall	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0860 716 F 02	South	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0860 719 F 02	Hadfield	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0860 719 F 07	Hadfield - Collocated	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
0860 724 F 02	Dartman Field	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0

TABLE 12b

AQCR 142 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD	TP
0380 001 F 01	Powell Co. Courthouse	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1260 024 F 03	Terry Smith Ranch	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0160 005 F 01	Greeley School	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0160 005 F 07	Greeley School - Collocated	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1480 020 F 02	#3 Ueland	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1480 023 F 02	#6 Hilderman	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1480 024 F 02	#7 Tamietti	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
1480 029 F 02	#16 Craddock	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

*Aluminum and Chromium were also monitored.

Key:

TSP - Total Suspended Particulates

B-S - Back Scatter (Visibility)

AS - Arsenic

CD - Cadmium

CU - Copper

PB - Lead

ZN - Zinc

F-P - Fluoride (Calcium Papers)

F-V - Fluoride (Vegetation)

NO_3 - Nitrate

SO_4 - Sulfate

CO - Carbon Monoxide

SO_2 - Sulfur Dioxide

S-R - Sulfation Rate

WS - Wind Speed

WD - Wind Direction

SD - Standard Deviation WD

TP - Temperature

TABLE 13a

AQCR 142 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Beaverhead/Dillon								
0420 001 F 01	Beaverhead Co. Courthouse	82	--	--	--	--	--	--
		83	--	--	--	--	--	--
		84	14	57	54	50	39.3	38.1
Deer Lodge/Anaconda								
0020 007 F 01	Lincoln School	82	58	128	125	89	40.6	24.4
		83	60	123	121	115	43.0	36.4
		84	54	210	145	132	42.4	34.7
0400 004 F 02	Hiway Junction	82	--	--	--	--	--	--
		83	--	--	--	--	--	--
		84	53	825	480	235	61.3	29.9
Gallatin/Bozeman								
0120 002 F 01	East Main City Building	82	52	265	180	148	67.4	56.6
		83	46	137	136	127	67.7	59.1
		84	30	198	179	174	81.1	68.8
0120 005 F 01	Whittier School	82	56	143	125	124	52.9	47.3
		83	56	118	114	107	52.6	47.2
		84	45	202	157	152	67.4	57.1

TABLE 13b

AQCR 142 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Jefferson/Montana City								
0760 905 F 05	Montana City School	82	18	188	182	154	86.8	73.5
		83	35	193	175	165	80.6	68.0
		84	40	349	201	196	97.9	78.4
Lewis and Clark/Helena								
0720 001 F 01	Cogswell Building	82	37	114	113	91	49.2	42.3
		83	55	193	165	137	48.6	41.0
		84	57	248	120	114	50.9	42.0
0720 013 G 05	Capital Courts	82	54	183	166	122	58.6	51.3
		83	59	232	212	178	72.8	58.6
		84	54	122	116	111	52.8	45.7
0720 016 G 05	Cooney Home	82	11	75	70	46	36.0	30.9
		83	61	147	128	83	39.6	33.9
		84	50	98	79	74	39.0	33.0
Lewis and Clark/East Helena								
0860 002 F 02	Hastie Residence	82	26	102	101	94	60.8	56.1
		83	68	135	132	126	58.3	52.8
		84	107	141	115	114	57.0	51.5

TABLE 13c

AQCR 142 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Lewis and Clark/East Helena								
0860 714 F 02	Firehall	82	--	--	--	--	---	---
		83	51	142	136	131	72.1	65.5
		84	115	216	206	196	75.2	65.5
0860 716 F 02	South	82	28	88	80	71	43.1	38.0
		83	58	90	76	72	34.6	30.8
		84	60	98	94	85	41.2	34.2
0860 719 F 02	Hadfield	82	25	133	121	113	66.7	60.8
		83	67	240	232	172	74.2	65.5
		84	116	326	301	273	85.6	70.2
0860 719 F 07	Hadfield - Collocated	82	30	130	126	122	72.1	66.3
		83	64	239	212	192	75.6	66.7
		84	109	295	268	259	79.4	64.6
0860 724 F 02	Dartman Field	82	--	--	--	--	---	---
		83	42	98	95	93	46.9	40.1
		84	59	174	114	109	50.0	40.5
Powell/Deer Lodge								
0380 001 F 01	Powell County Courthouse	82	--	--	--	--	--	--
		83	--	--	--	--	--	--
		84	19	109	87	76	48.8	42.5

TABLE 13d

AQCR 142 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Powell/Ovando								
1260 024 F 03	Terry Smith Ranch	82	56	79	79	64	20.5	14.1
		83	53	68	57	54	17.0	12.2
		84	47	231	145	97	27.8	14.8
Silver Bow/Butte								
0160 005 F 01	Greeley School	82	46	225	216	187	70.6	57.9
		83	56	229	224	206	64.4	50.1
		84	34	193	180	129	53.3	42.7
0160 005 F 07	Greeley School - Collocated	82	48	229	198	192	74.1	62.2
		83	56	257	255	248	71.2	55.1
		84	45	212	206	190	62.0	49.3

TABLE 14

AQCR 142 - ALUMINUM

Micrograms/Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Deer Lodge/Anaconda							
0400 004 F 02	Hiway Junction	82	--	--	--	--	--
		83	--	--	--	--	--
		84	53	7.03	5.03	3.41	0.74

TABLE 15a

AQCR 142 - ARSENIC

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Deer Lodge/Anaconda							
0400 004 F 02	Hiway Junction	82	--	--	--	--	--
		83	--	--	--	--	--
		84	53	2.011	1.842	1.127	.170
Lewis and Clark/East Helena							
0860 002 F 02	Hastie Residence	82	14	.510	.463	.444	.232
		83	82	1.015	.804	.728	.239
		84	107	.820	.620	.557	.195
0860 714 F 02	Firehall	82	--	----	----	----	----
		83	55	1.836	1.311	1.270	.551
		84	115	1.657	1.504	1.378	.416
0860 716 F 02	South	82	11	.256	.171	.143	.090
		83	67	.424	.374	.331	.113
		84	60	.341	.298	.244	.097
0860 719 F 02	Hadfield	82	14	.688	.340	.339	.207
		83	70	1.208	1.175	.957	.333
		84	116	1.359	.847	.821	.261
0860 719 F 07	Hadfield - Collocated	82	15	.748	.445	.440	.231
		83	67	1.263	1.066	.906	.336
		84	109	1.142	.927	.923	.242

TABLE 15b

AQCR 142 - ARSENIC

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Lewis and Clark/East Helena							
0860 724 F 02	Dartman Field	82	--	----	----	----	----
		83	42	1.184	.925	.751	.321
		84	59	.934	.729	.594	.206

TABLE 16a

AQCR 142 - CADMIUM

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Deer Lodge/Anaconda							
0400 004 F 02	Hiway Junction	82	--	--	--	--	--
		83	--	--	--	--	--
		84	53	.055	.053	.017	.004
Lewis and Clark/East Helena							
0860 002 F 02	Hastie Residence	82	14	1.230	.359	.261	.188
		83	82	2.760	.449	.433	.142
		84	107	.840	.676	.663	.117
0860 714 F 02	Firehall	82	--	----	----	----	----
		83	55	1.176	1.161	.914	.296
		84	115	1.661	1.098	1.005	.250
0860 716 F 02	South	82	11	.156	.062	.060	.040
		83	67	.211	.209	.189	.048
		84	60	.862	.682	.179	.065
0860 719 F 02	Hadfield	82	14	.270	.244	.198	.097
		83	70	1.676	.975	.784	.194
		84	116	1.695	.919	.858	.193
0860 719 F 07	Hadfield - Collocated	82	15	.319	.256	.207	.100
		83	67	1.691	.702	.514	.178
		84	109	1.595	1.118	.785	.181

TABLE 16b

AQCR 142 - CADMIUM

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Lewis and Clark/East Helena							
0860 724 F 02	Dartman Field	82	--	----	----	----	----
		83	42	.698	.548	.477	.153
		84	59	1.127	.540	.471	.137

TABLE 17

AQCR 142 - CHROMIUM

Micrograms/Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Deer Lodge/Anaconda							
0400 004 F 02	Hiway Junction	82	--	--	--	--	--
		83	--	--	--	--	--
		84	53	0.03	0.02	0.01	0.00

TABLE 18a

AQCR 142 - COPPER

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Deer Lodge/Anaconda							
0400 004 F 02	Hiway Junction	82	--	--	--	--	--
		83	--	--	--	--	--
		84	53	6.83	6.19	2.25	.48
Lewis and Clark/East Helena							
0860 002 F 02	Hastie Residence	82	14	9.75	4.72	3.02	2.06
		83	82	5.37	5.25	4.71	1.37
		84	107	18.24	8.19	6.61	1.64
0860 714 F 02	Firehall	82	--	---	---	---	---
		83	55	32.95	23.71	23.46	6.44
		84	115	86.07	45.49	33.68	7.25
0860 716 F 02	South	82	11	1.13	.52	.44	.40
		83	67	.99	.97	.96	.46
		84	60	2.95	1.39	.99	.41
0860 719 F 02	Hadfield	82	14	10.41	3.65	2.70	2.05
		83	70	16.50	12.86	12.06	3.29
		84	116	102.90	29.05	14.62	3.90
0860 719 F 07	Hadfield - Collocated	82	15	4.43	4.29	3.49	1.92
		83	67	22.67	14.47	13.28	3.74
		84	109	84.68	32.16	17.82	3.95

TABLE 18b

AQCR 142 - COPPER

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Lewis and Clark/East Helena							
0860 724 F 02	Dartman Field	82	--	---	---	---	---
		83	42	32.19	8.23	6.91	2.61
		84	59	35.92	7.45	4.90	1.91

TABLE 19a

AQCR 142 - LEAD - DAILY

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Deer Lodge/Anaconda							
0020 007 F 01	Lincoln School	82	58	.31	.14	.11	.04
		83	60	.17	.10	.10	.04
		84	54	.13	.09	.09	.02
0400 004 F 02	Hiway Junction	82	--	--	--	--	--
		83	--	--	--	--	--
		84	53	1.22	.99	.44	.09
Jefferson/Montana City							
0760 905 F 05	Montana City School	82	13	.41	.33	.25	.14
		83	17	.87	.67	.50	.23
		84	39	.76	.51	.41	.13
Lewis and Clark/East Helena							
0860 002 F 02	Hastie Residence	82	26	5.20	4.08	4.07	2.17
		83	82	10.01	9.09	6.31	2.91
		84	107	12.89	11.09	10.25	2.88
0860 714 F 02	Firehall	82	--	---	---	---	---
		83	55	16.75	13.13	12.73	5.04
		84	115	19.27	17.12	17.07	5.28
0860 716 F 02	South	82	28	4.28	3.45	2.95	1.29
		83	67	3.36	3.24	3.16	.99
		84	60	7.11	5.53	3.85	1.27

TABLE 19b

AQCR 142 - LEAD - DAILY

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Lewis and Clark/East Helena							
0860 719 F 02	Hadfield	82	25	7.62	6.18	4.29	2.34
		83	70	8.39	7.29	7.21	3.09
		84	116	17.73	12.88	12.79	3.48
0860 719 F 07	Hadfield - Collocated	82	30	7.34	6.55	5.61	2.55
		83	67	9.28	7.86	7.19	3.08
		84	109	20.43	12.58	12.03	3.23
0860 724 F 02	Dartman Field	82	--	---	---	---	---
		83	42	9.80	7.99	7.46	2.76
		84	59	10.96	8.34	7.85	2.69

TABLE 20a

AQCR 142 - LEAD--QUARTERLY

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Jan-Mar Num Obs	Jan-Mar Arith Mean	Apr-Jun Num Obs	Apr-Jun Arith Mean	Jul-Sep Num Obs	Jul-Sep Arith Mean	Oct-Dec Num Obs	Oct-Dec Arith Mean
Deer Lodge/Anaconda										
0020 007 F 01	Lincoln School	82	13	.02	15	.04	15	.04	15	.07
		83	15	.04	15	.04	15	.04	15	.05
		84	12	.04	13	.00	15	.02	15	.02
0400 004 F 02	Hiway Junction	82	--	--	--	--	--	--	--	--
		83	--	--	--	--	--	--	--	--
		84	--	--	--	--	25	.03	28	.14
Jefferson/Montana City										
0760 905 F 05	Montana City School	82	2	.28	1	.13	10	.12	--	---
		83	--	---	--	---	7	.17	10	.28
		84	4	.06	5	.01	15	.09	15	.22
Lewis & Clark/East Helena										
0860 002 F 02	Hastie Residence	82	1	1.94	1	1.46	9	2.18	15	2.23
		83	15	3.11	14	2.51	24	2.93	29	3.00
		84	29	3.26	26	1.71	26	2.66	26	3.86
0860 714 F 02	Firehall	82	--	---	--	---	--	---	--	---
		83	--	---	--	---	25	4.78	30	5.25
		84	30	5.77	27	2.74	29	5.61	29	6.82

TABLE 20b

AQCR 142 - LEAD--QUARTERLY

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Jan-Mar Num Obs	Jan-Mar Arith Mean	Apr-Jun Num Obs	Apr-Jun Arith Mean	Jul-Sep Num Obs	Jul-Sep Arith Mean	Oct-Dec Num Obs	Oct-Dec Arith Mean
Lewis and Clark/East Helena										
0860 716 F 02	South	82	1	1.81	2	2.02	13	1.52	12	.89
		83	11	.95	13	1.07	27	.78	16	1.31
		84	15	1.47	15	1.21	15	0.98	15	1.43
0860 719 F 02	Hadfield	82	1	7.62	2	1.59	7	2.63	15	1.95
		83	15	3.27	2	3.20	24	3.00	29	3.07
		84	28	4.12	29	1.82	30	3.38	29	4.63
0860 719 F 07	Hadfield - Collocated	82	1	7.34	2	2.75	11	2.68	16	2.14
		83	15	3.47	2	3.36	22	2.92	28	2.98
		84	25	3.18	26	1.80	28	3.44	30	4.31
0860 724 F 02	Dartman Field	82	--	---	--	---	--	---	--	---
		83	--	---	1	1.03	25	2.95	16	2.57
		84	16	3.19	15	1.26	14	3.10	14	3.23

TABLE 21a

AQCR 142 - ZINC

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Deer Lodge/Anaconda							
0400 004 F 02	Hiway Junction	82	--	--	--	--	--
		83	--	--	--	--	--
		84	53	8.41	4.48	1.29	.43
Lewis and Clark/East Helena							
0860 002 F 02	Hastie Residence	82	14	1.52	1.52	1.20	.84
		83	82	6.49	4.60	4.34	1.47
		84	107	13.29	7.04	5.00	1.97
0860 714 F 02	Firehall	82	--	---	---	---	---
		83	55	6.53	6.00	4.75	1.91
		84	115	16.80	12.47	10.77	3.02
0860 716 F 02	South	82	11	.72	.69	.46	.30
		83	67	2.06	1.39	.99	.36
		84	60	1.68	1.52	1.29	.45
0860 719 F 02	Hadfield	82	14	3.06	1.97	1.02	.84
		83	70	16.77	16.29	11.86	2.42
		84	116	114.80	60.73	54.95	8.41
0860 719 F 07	Hadfield - Collocated	82	15	3.21	2.25	2.19	.92
		83	67	17.71	15.77	12.98	2.53
		84	109	113.10	60.82	51.96	7.80

TABLE 21b

AQCR 142 - ZINC

Micrograms per Cubic Meter

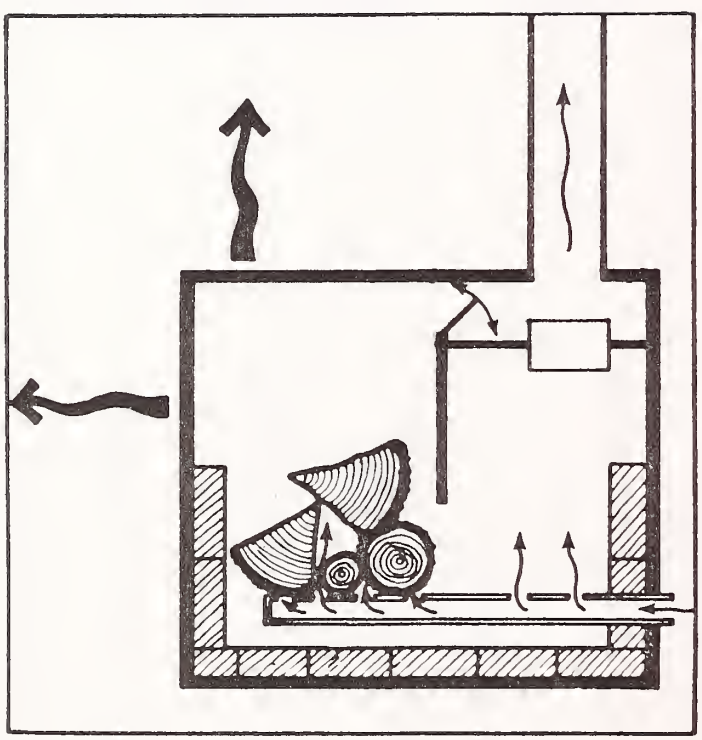
County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Lewis and Clark/East Helena							
0860 724 F 02	Dartman Field	82	--	---	---	---	---
		83	42	5.42	3.04	2.71	1.11
		84	59	9.86	6.89	5.30	1.78

TABLE 22

AQCR 142 - FLUORIDE (VEGETATION)

Micrograms per Gram

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Grazing Season Average
Deer Lodge/Anaconda							
0400 041 F 02	#15 Peterson	82	--	---	---	---	---
		83	5	15.0	12.5	12.5	10.8
		84	3	19.5	21.0	5.5	15.3
Silver Bow/Ramsay							
1480 020 F 02	#3 Ueland	82	--	---	---	---	---
		83	--	---	---	---	---
		84	1	27.0	---	---	---
1480 023 F 02	#6 Hilderman	82	4	83.0	35.5	25.5	39.8
		83	6	44.5	31.5	29.0	25.6
		84	8	133.5	89.0	62.5	54.9
1480 024 F 02	#7 Tamietti	82	3	90.5	31.0	10.5	44.0
		83	6	34.5	26.0	24.5	20.1
		84	5	46.5	32.0	21.0	24.0
1480 029 F 02	#16 Craddock	82	--	---	---	---	---
		83	5	25.0	20.0	11.0	13.6
		84	6	93.5	69.0	31.0	42.7



AQCR 143

INTRODUCTION

This section deals with the air monitoring activities and pollution concerns in AQCR 143.

LOCATION AND PHYSICAL FEATURES

AQCR 143 makes up the eastern third of the state. Glaciated plains cover the northern half of the region (Missouri River area and north) while sedimentary plains cover the southern half. The Missouri River travels east to west in the northern half; the Yellowstone River travels in a northeast direction through the southern half. The two rivers meet just across the Montana border in North Dakota. Figure 4 shows a regional map.

POPULATION

The population of AQCR 143 is 105,700 (1984 estimate) or 12.8 percent of the state population. The people are scattered around the region in various small communities. The largest populated counties in the region are Richland (Sidney), Custer (Miles City) and Dawson (Glendive).

POLLUTION SOURCES

Pollution sources and types of pollutants are listed for each county in the region. A final category lists the types of sources that would be expected in all counties in the region. The sources by county are as follows:

Custer County

Grain elevator/feed processing (particulates)

Daniels County

Coal-fired power plant (actually in Saskatchewan, Canada) - (particulates, SO_2, NO_x)

Dawson County

Grain elevator/feed processing (particulates)

Richland County

Sugar beet refinery (particulates, SO_2, NOx)
Coal-fired power plant (particulates, SO_2, NOx)
Two gas sweetening plants (SO_2)
Coal strip mine (particulates)
Oil well flares and vents (SO_2, H_2S)

Roosevelt County

Oil refinery (particulates, SO_2, NOx, CO)
Oil well flares and vents (SO_2, H_2S)

Rosebud County

Two coal strip mines (particulates)
Three coal-fired power plants (particulates, SO_2, NOx)

All Counties

Asphalt plants (particulates)
Gravel crushers (particulates)
Agricultural activities (particulates)
Wind erosion (particulates)
Automobiles (CO, NO_x, re-entrained particulates)

MONITORING SITE DESCRIPTIONS

A number of monitoring sites were in operation during 1983. Table 23 lists the monitoring site descriptions. This includes site codes, site name, supporting agency, station type, project description, city name and county name.

Table 24 gives an inventory of pollutants and wind parameters measured at each site.

DATA SUMMARY

Total Suspended Particulates

TSP was monitored at eight sites in this region in 1983. The maximum 24-hour observation was 233 ug/m^3 at the Sidney downtown. The highest annual

geometric average was 68.0 ug/m^3 at the Sidney Downtown site. There were no violations of the TSP standards. Table 25 summarizes the TSP data for this region.

Nitrates

Nitrates were analyzed from hi-vol filters at one site (Sidney Downtown) in this region. The maximum 24-hour observation was 3.8 ug/m^3. There is no air pollution standard for nitrates. Table 26 summarizes the nitrate data for this region.

Sulfates

Sulfates were analyzed from hi-vol filters at one site (Sidney Downtown) in this region. The maximum 24-hour observation was 13.4 ug/m^3. There is no air pollution standard for sulfates. Table 27 summarizes the sulfate data for this region.

Sulfur Dioxide

Sulfur dioxide was monitored at two sites in this region in 1984. The maximum one hour reading was .085 ppm at the Scobey Border site. The maximum three hour average was .045 ppm at the Scobey Border site. The maximum twenty-four hour average was .012 ppm at both the Scobey Border site and the Hanrahan site. The highest annual average was .001 ppm. There were no violations of the SO_2 standards. Table 28 summarizes the sulfur dioxide data for this region.

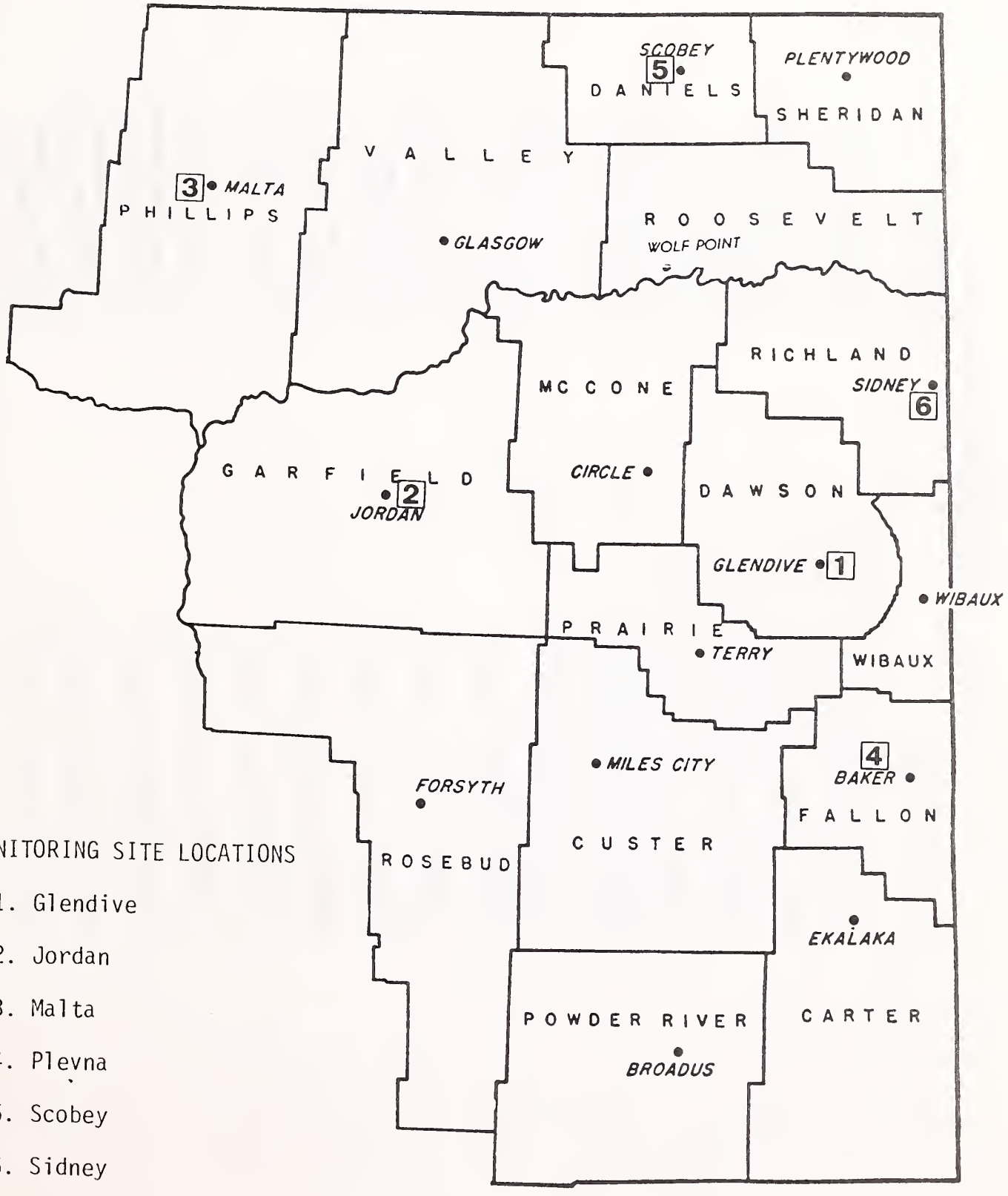
Sulfation Rate

Sulfation rate was monitored at eighteen sites in Richland and Daniels Counties. Eight of the sites were collocated. The highest monthly average was .19 mg $SO_3/cm^2/day$ at both the Shell Oil and South Sidney Pumper sites. The highest annual average was .10 mg $SO_3/cm^2/day$ at the Shell Oil site. There is

no standard for sulfation rate; however, readings greater than .5 mg $SO_3/cm^2/day$ indicate possible trouble spots. Table 28 summarizes the sulfation rate data for this region.

FIGURE

AQCR 143 - REGION MAP



MONITORING SITE LOCATIONS

1. Glendive
2. Jordan
3. Malta
4. Plevna
5. Scobey
6. Sidney

TABLE 23a

AQCR 143 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0340 001 F 03	SCOBEY BORDER #1, US & CANADIAN BORDER MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL BACKGROUND	SCOBEY DANIELS
0340 001 F 07	SCOBEY BORDER #1, US & CANADIAN BORDER MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL QA-COLOCATED SAMPLER	SCOBEY DANIELS
0340 002 F 03	RICHARDSON, 1 MILE NORTH OF SCOBEY MONTANA AIR QUALITY BUREAU	RURAL-NEAR URBAN BACKGROUND	SCOBEY DANIELS
0340 002 F 07	RICHARDSON, 1 MILE NORTH OF SCOBEY MONTANA AIR QUALITY BUREAU	RURAL-NEAR UREAN QA-COLOCATED SAMPLER	SCOBEY DANIELS
0340 004 F 03	HANRAHAN RANCH, NEAR WHITETAIL MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL BACKGROUND	SCOBEY DANIELS
0340 004 F 07	HANRAHAN RANCH, NEAR WHITETAIL MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL QA-COLOCATED SAMPLER	SCOBEY DANIELS
0340 005 F 02	MICROWAVE TOWER MONTANA AIR QUALITY BUREAU	REMOTE SOURCE ORIENTED	SCOBEY DANIELS
0340 005 F 07	MICROWAVE TOWER MONTANA AIR QUALITY BUREAU	REMOTE QA-COLOCATED SAMPLER	SCOBEY DANIELS
0340 006 F 02	FLAXVILLE MONTANA AIR QUALITY BUREAU	RURAL-NEAR URBAN SOURCE ORIENTED	FLAXVILLE DANIELS
0340 006 F 07	FLAXVILLE MONTANA AIR QUALITY BUREAU	RURAL-NEAR URBAN QA-COLOCATED SAMPLER	FLAXVILLE DANIELS
0340 007 F 02	TV TOWER HILL MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SCOBEY DANIELS
0340 007 F 07	TV TOWER HILL MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL QA-COLOCATED SAMPLER	SCOBEY DANIELS
0340 008 F 02	SCOBEY DOWNTOWN MONTANA AIR QUALITY BUREAU	CITY CENTER-COMMERCIAL SOURCE ORIENTED	SCOBEY DANIELS
0340 008 F 07	SCOBEY DOWNTOWN MONTANA AIR QUALITY BUREAU	CITY CENTER-COMMERCIAL QA-COLOCATED SAMPLER	SCOBEY DANIELS
0340 009 F 02	FOUR BUTTES MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SCOBEY DANIELS
0340 009 F 07	FOUR BUTTES MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL QA-COLOCATED SAMPLER	SCOBEY DANIELS

TABLE 23b
AQCR 143 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0440 001 N 05	PLEVNA MONTANA AIR QUALITY BUREAU	RURAL-NEAR URBAN SPECIAL STUDIES	PLEVNA FALLON
0540 002 F 05	JORDAN (RANDY BILLINGS RANCH) MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SPECIAL STUDIES	JORDAN GARFIELD
0600 002 F 01	MEDICAL ARTS CENTER, OILWORTH & AMES MONTANA AIR QUALITY BUREAU	SURBURBAN-RESIDENTIAL POPULATION ORIENTED	GLENDIVE DAWSON
1200 001 N 05	MALTA BLM - BOWDOIN NAT WILDLIFE REFUGE MONTANA AIR QUALITY BUREAU	RURAL-UNCLASSIFIED SPECIAL STUDIES	MALTA PHILLIPS
1320 011 F 01	SIDNEY DOWNTOWN - 115 2ND ST SE MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL POPULATION ORIENTED	SIDNEY RICHLAND
1320 011 F 02	#1 PETERSON-MORLOCK - 2.7 MI NW OF SIDNEY MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND
1320 012 F 02	#2 PUBLIC WELFARE OFC - 5TH ST & 3RD AVE MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND
1320 013 F 02	#3 SHELL OIL - 0.1 MI E JCT HWY 16 & 23 MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND
1320 014 F 02	#4 YELLOWSTONE RIV BRDG -1 MI S JCT 16&23 MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND
1320 015 F 02	#5 FAIRVIEW NORTH - 2.7 MI W OF FAIRVIEW MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND
1320 016 F 02	#6 SOUTH SIDNEY PUMPER -.3 MI W JT 16&200 MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND
1320 017 F 02	#7 SOUTH SIDNEY FLARE - .9 MI W JT 16&200 MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND
1320 018 F 02	#8 NORTH SIDNEY - 2.1 MI N OF SIDNEY MONTANA AIR QUALITY BUREAU	RURAL-NEAR URBAN SOURCE ORIENTED	SIDNEY RICHLAND
1320 019 F 02	#9 RICHLAND PARK ROAD - 3.5 MI NE SIDNEY MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND
1320 020 F 02	COCKE RESIDENCE AT RICHLAND CITY MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	SIDNEY RICHLAND

TABLE 24a

AQCR 143 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD	TP
0340 001 F 03	Scobey Border	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
0340 001 F 07	Scobey Border - Collocated	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 002 F 03	Richardson	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 002 F 07	Richardson - Collocated	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 004 F 03	Hanrahan	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
0340 004 F 07	Hanrahan - Collocated	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 005 F 02	Microwave Tower	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 005 F 07	Microwave Tower - Collocated	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 006 F 02	Flaxville	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 006 F 07	Flaxville - Collocated	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 007 G 02	TV Tower Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 007 G 07	TV Tower Hill - Collocated	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 008 G 02	Scobey Downtown	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 008 G 07	Scobey Downtown - Collocated	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 009 G 02	Four Buttes	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0340 009 G 07	Four Buttes - Collocated	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0600 002 F 01	Medical Arts Center	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0440 001 N 05	Plevna	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 24b

AQCR 143 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD
0540 002 F 05	Billings Ranch	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200 001 N 05	Malta BLM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1320 010 F 01	Sidney Downtown	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
1320 011 F 02	Peterson - Morlock	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 012 F 02	Public Welfare Office	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 013 F 02	Shell Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 014 F 02	Yellowstone River Bridge	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 015 F 02	Fairview North	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 016 F 02	South Sidney Pumper	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 017 F 02	South Sidney Flare	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 018 F 02	North Sidney	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 019 F 02	Richland Park Road	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
1320 020 F 02	Cooke Residence	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Key:

TSP - Total Suspended Particulates

B-S - Back Scatter (Visibility)

AS - Arsenic

CD - Cadmium

CU - Copper

PB - Lead

ZN - Zinc

F-P - Fluoride (Calcium Papers)

F-V - Fluoride (Vegetation)

NO_3 - Nitrate

SO_4 - Sulfate

CO - Carbon Monoxide

SO_2 - Sulfur Dioxide

S-R - Sulfation Rate

WS - Wind Speed

WD - Wind Direction

SD - Standard Deviation WD

TP - Temperature

TABLE 25a

AQCR 143 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Daniels/Scobey								
0340 001 F 03	Scobey Border	82	43	234	50	47	26.0	17.5
		83	25	58	50	46	16.7	9.7
		84	26	54	48	42	23.3	16.4
0340 002 F 03	Richardson	82	21	63	28	25	16.5	13.2
		83	24	233	54	50	24.1	11.0
		84	26	114	62	48	25.3	17.1
0340 004 F 03	Hanrahan Ranch	82	39	144	47	43	22.1	16.0
		83	27	108	56	55	18.4	9.4
		84	30	89	84	48	27.3	19.4
Dawson/Glendive								
0600 002 F 01	Glendive MAC	82	13	66	52	41	28.9	24.8
		83	31	60	58	55	27.8	14.4
		84	34	72	69	64	33.7	28.4
Fallon/Plevna								
0440 001 N 05	Plevna	82	25	98	79	51	27.8	21.7
		83	35	121	107	86	34.2	23.2
		84	5	60	54	50	38.4	31.6

TABLE 25b

AQCR 143 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Garfield/Jordan								
0540 002 F 05	Billings Ranch	82	35	28	28	25	12.5	10.3
		83	24	43	41	36	16.4	12.6
		84	8	9	6	5	4.2	3.6
Phillips/Malta								
1200 001 N 05	Bowdoin Refuge	82	26	65	41	40	19.2	15.6
		83	22	44	42	41	20.4	17.2
		84	51	60	55	52	17.4	14.0
Richland/Sidney								
1320 010 F 01	Sidney Downtown	82	--	--	--	--	---	---
		83	30	116	96	92	56.1	50.8
		84	30	233	155	132	78.1	68.0

TABLE 26

AQCR 143 - NITRATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Richland/Sidney							
1320 010 F 01	Sidney - Downtown	82	--	---	---	---	---
		83	--	---	---	---	---
		84	23	3.8	2.6	1.9	.9

TABLE 27

AQCR 143 - SULFATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Richland/Sidney							
1320 010 F 01	Sidney - Downtown	82	--	---	---	---	---
		83	30	9.2	8.4	6.4	4.6
		84	30	13.4	7.0	6.7	4.9

TABLE 28a

AQCR 143 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0340 001 F 03	Scobey - Border	82	01	744	.016	.015	.015	.013	.004	.000
			02	545	.017	.015	.014	.013	.009	.004
			03	741	.023	.021	.021	.020	.020	.008
			04	592	.017	.015	.015	.015	.011	.004
			05	744	.022	.019	.019	.017	.011	.002
			06	718	.028	.024	.024	.022	.011	.002
			07	240	.023	.020	.015	.015	.003	.001
			08	714	.033	.030	.023	.025	.013	.001
			09	710	.060	.053	.044	.052	.012	.002
			10	735	.047	.043	.030	.039	.011	.003
			11	699	.036	.035	.034	.030	.010	.005
			12	740	.022	.014	.012	.009	.002	.000
		ANNUAL		7922	.060	.053	.047	.052	.020	.002
0340 001 F 03	Scobey - Border	83	01	708	.042	.042	.036	.040	.011	.002
			02	662	.017	.017	.016	.014	.007	.002
			03	730	.009	.009	.008	.009	.003	.000
			04	713	.034	.026	.023	.024	.008	.001
			05	387	.041	.034	.023	.022	.005	.001
			06	696	.023	.018	.015	.014	.004	.000
			07	---	---	---	---	---	---	---
			08	---	---	---	---	---	---	---
			09	---	---	---	---	---	---	---
			10	---	---	---	---	---	---	---
			11	---	---	---	---	---	---	---
			12	---	---	---	---	---	---	---
		ANNUAL		3896	.042	.042	.041	.040	.011	.001

TABLE 28b

AQCR 143 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0340 001 F 03	Scobey - Border	84	01	---	---	---	---	---	---	---
			02	---	---	---	---	---	---	---
			03	---	---	---	---	---	---	---
			04	---	---	---	---	---	---	---
			05	---	---	---	---	---	---	---
			06	---	---	---	---	---	---	---
			07	729	.060	.050	.035	.041	.011	.001
			08	731	.080	.060	.050	.040	.012	.001
			09	701	.025	.020	.018	.017	.003	.000
			10	739	.032	.020	.016	.020	.004	.000
			11	708	.085	.055	.050	.045	.012	.001
			12	738	.048	.015	.011	.018	.003	.000
		ANNUAL		4346	.085	.080	.060	.045	.012	.000

TABLE 28c

AQCR 143 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0340 004 F 03	Hanrahan	82	01	551	.005	.005	.004	.003	.003	.001
			02	647	.009	.007	.006	.006	.003	.001
			03	663	.007	.007	.007	.006	.006	.001
			04	666	.003	.003	.003	.003	.002	.000
			05	641	.012	.010	.009	.009	.006	.001
			06	624	.005	.005	.004	.003	.002	.000
			07	216	.000	.000	.000	.000	.000	.000
			08	707	.010	.004	.004	.003	.001	.000
			09	705	.022	.020	.015	.016	.004	.000
			10	726	.013	.013	.008	.007	.001	.000
			11	720	.029	.024	.017	.019	.006	.000
			12	742	.012	.012	.012	.008	.001	.000
		ANNUAL		7608	.029	.024	.022	.019	.006	.000
0340 004 F 03	Hanrahan	83	01	682	.020	.011	.010	.011	.002	.000
			02	663	.024	.018	.014	.009	.003	.000
			03	711	.008	.005	.003	.004	.000	.000
			04	714	.010	.005	.005	.004	.001	.000
			05	731	.016	.014	.010	.007	.001	.000
			06	709	.010	.004	.004	.004	.001	.000
			07	---	---	---	---	---	---	---
			08	---	---	---	---	---	---	---
			09	---	---	---	---	---	---	---
			10	---	---	---	---	---	---	---
			11	---	---	---	---	---	---	---
			12	---	---	---	---	---	---	---
		ANNUAL		4210	.024	.020	.018	.011	.003	.000

TABLE 28d

AQCR 143 - SULFUR DIOXIDE

Parts per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	3 Hr Max	24 Hr Max	Monthly Average
0340 004 F 03	Hanrahan	84	01	---	---	---	---	---	---	---
			02	---	---	---	---	---	---	---
			03	---	---	---	---	---	---	---
			04	---	---	---	---	---	---	---
			05	---	---	---	---	---	---	---
			06	---	---	---	---	---	---	---
			07	552	.025	.022	.012	.018	.004	.000
			08	657	.048	.027	.021	.025	.007	.001
			09	713	.012	.010	.007	.009	.004	.002
			10	739	.024	.018	.015	.017	.005	.003
			11	703	.041	.035	.030	.032	.012	.002
			12	650	.023	.012	.012	.010	.004	.001
		ANNUAL		4014	.048	.041	.035	.032	.012	.001

TABLE 29a

AQCR 143 - SULFATION RATE

Milligrams Sulfur Trioxide per 100 Square Centimeters per Day

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Daniels/Scobey							
0340 001 F 03	Scobey Border	84	6	.05	.05	.02	.02
0340 001 F 07	Scobey Border - Collocated	84	5	.04	.02	.01	.01
0340 002 F 03	Richardson	84	6	.02	.00	.00	.00
0340 002 F 07	Richardson - Collocated	84	6	.00	.00	.00	.00
0340 004 F 03	Hanrahan	84	5	.04	.01	.00	.01
0340 004 F 07	Hanrahan - Collocated	84	6	.04	.03	.01	.01
0340 005 F 02	Microwave Tower	84	5	.02	.01	.00	.00
0340 005 F 07	Microwave Tower - Collocated	84	6	.05	.02	.00	.01
0340 006 F 02	Flaxville	84	6	.05	.01	.00	.01
0340 006 F 07	Flaxville - Collocated	84	6	.01	.01	.00	.00
0340 007 F 02	TV Tower Hill	84	6	.01	.00	.00	.00
0340 007 F 07	TV Tower Hill - Collocated	84	6	.05	.03	.01	.01
0340 008 F 02	Scobey Downtown	84	4	.09	.03	.00	.03
0340 008 F 07	Scobey Downtown - Collocated	84	6	.07	.04	.03	.02

TABLE 29b

AQCR 143 - SULFATION RATE

Milligrams Sulfur Trioxide per 100 Square Centimeters per Day

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Daniels/Scobey							
0340 009 F 02	Four Buttes	84	5	.01	.00	.00	.00
0340 009 F 07	Four Buttes - Collocated	84	6	.01	.00	.00	.00
Richland/Sidney							
1320 011 F 02	Peterson - Morlock	82	6	.30	.11	.09	.11
		83	7	.14	.13	.12	.08
		84	4	.14	.11	.10	.08
1320 012 F 02	Public Welfare Office	82	2	.14	.12	---	.13
		83	8	.18	.16	.14	.10
		84	5	.10	.08	.00	.03
1320 013 F 02	Shell Oil	82	6	.36	.21	.14	.17
		83	6	.19	.19	.14	.14
		84	5	.19	.11	.11	.10
1320 014 F 02	Yellowstone River Bridge	82	5	.17	.08	.05	.07
		83	5	.10	.10	.07	.05
		84	6	.11	.08	.05	.05
1320 015 F 02	Fairview North	82	6	.22	.10	.08	.08
		83	7	.16	.13	.11	.08
		84	4	.09	.08	.06	.05

TABLE 29c

AQCR 143 - SULFATION RATE

Milligrams Sulfur Trioxide per 100 Square Centimeters per Day

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Richland/Sidney							
1320 016 F 02	South Sidney Pumper	82	5	.16	.06	.06	.07
		83	8	.12	.10	.10	.08
		84	6	.19	.09	.08	.08
1320 017 F 02	South Sidney Flare	82	6	.12	.09	.03	.05
		83	6	.13	.11	.11	.08
		84	6	.16	.07	.05	.05
1320 018 F 02	North Sidney	82	5	.11	.06	.04	.05
		83	9	.09	.08	.07	.05
		84	5	.09	.08	.07	.05
1320 019 F 02	Richland Park Road	82	5	.12	.12	.09	.08
		83	9	.21	.14	.14	.10
		84	6	.11	.10	.10	.09
1320 020 F 02	Cooke Residence	82	--	---	---	---	---
		83	--	---	---	---	---
		84	2	.06	.06	---	.06

AQCR 144

INTRODUC ION

Thi section deals with the air monitoring activities and pollution concerns in AQCR 144.

LOCATION AND PHYSICAL FEATURES

AQC 144 is located in the northwest corner of the state. The region is entirely west of the Continental Divide. The region contains several distinct mountain ranges separated by fairly narrow valleys. The main rivers in the region a e the Clark Fork, Flathead, and Kootenai. Figure 5 shows a regional map.

POPULATI N

The population of AQCR 144 is 207,200 (1984 estimate) or 25.1 percent of the stat population. The majority of the people in this region live in Missoula County (Missoula) and Flathead County (Kalispell).

POLLUTIO SOURCES

Pol ution sources and types of pollutants are listed for each county in the regi n. A final category lists the types of sources that would be expected in all counties in the region. The sources by county are as follows:

Fla head County

- Aluminum reduction plant (particulates, fluorides)
- Two plywood plants (particulates)
- Particleboard plant (particulates)
- Several sawmills (particulates)

Lak County

- Two sawmills (particulates)

Lin oln County

- Copper/silver mine (particulates)
- Vermiculite mining and manufacturing (particulates)

Plywood plant (particulates)
Sawmills (particulates)

Mineral County

Two sawmills (particulates)

Missoula County

Plywood plant (particulates)
Particleboard plant (particulates)
Several sawmills (particulates)
Kraft pulp mill (particulates, H_2S)

Ravalli County

Two sawmills (particulates)

Sanders County

Three sawmills (particulates)
Antimony mine and mill (particulates)

All Counties

Asphalt plants (particulates)
Gravel crushers (particulates)
Automobiles (particulates, CO)
Slash and open burning (particulates, CO)
Residential wood burning (particulates, CO)
Agricultural activities (particulates)

MONITORING SITE DESCRIPTIONS

A number of monitoring sites were in operation during 1984. Table 30 lists the monitoring site descriptions. This includes site codes, site name, supporting agency, station type, project description, city name and county name.

Table 31 gives an inventory of pollutants and wind parameters measured at each site.

DATA SUMMARY

Total Suspended Particulates

TSP was monitored at 17 sites in this region in 1984. Three of the sites were collocated. The maximum 24-hour observation was 463 ug/m^3 at the Lincoln

County C urthouse site in Libby. The highest annual geometric average was 107.4 ug m^3 at the Brown Residence in Libby. The highest annual arithmetic average as 124.8 ug/m^3 also at the Brown Residence. There were four violations of the f deral annual standard: Brown Residence and Lincoln County Courthouse in Libby Anders Residence in Columbia Falls, and Sanders County Courthouse in Thompson Falls. There were four sites that were in violation of the Montana annual a ithmetic standard: Brown Residence and Lincoln Courthouse in Libby, Anders R sidence in Columbia Falls, and the Sanders County Courthouse in Thompson Falls. There were eight sites in violation of the federal 24-hour standard and there were eight sites in violation of the Montana 24-hour standard Table 32 summarizes the TSP data for this region.

Visibili t

Visibility was measured with an integrating nephelometer at two sites in this regi n in 1984. The maximum hourly observation was 93.1 x 10^{-5} particle scatterir coefficient per meter at the Wrecking Yard site. The annual average for the f ur months the sampler ran at this site was 21.2 x 10^{-5} particle scattering co fficient per meter. The annual standard of 3 x 10^{-5} applies only to PSD Class I areas. Table 33 summarizes the visibility data for this region.

Nitrates

Nitr tes were analyzed from hi-vol filters at three sites in this region in 1984. T e maximum 24-hour observation was 3.2 ug/m^3 at the St. Mary site in Glacier P rk. There is no air pollution standard for nitrates. Table 34 summarizes t e nitrate data for this region.

Sulfates

Sulf tes were analyzed from hi-vol filters at six sites in this region in 1984. The maximum 24-hour observation was 12.2 ug/m^3 at the Hoerner Waldorf

#2 site in Missoula. There is no air pollution standard for sulfates. Table 35 summarizes the sulfate data for this region.

Fluoride (Vegetation)

Fluoride in vegetation was analyzed at three sites in this region in 1984. The maximum monthly observation was 57.5 ug/g at the Doane site near Columbia Falls. The highest grazing season average was 19.2 ug/g, also at the Doane site. There was one violation of the monthly fluoride in vegetation standard; there were no violations of the grazing season standard. Table 36 summarizes the fluoride in vegetation data for this region.

Carbon Monoxide

Carbon monoxide was monitored at two sites in the region in 1984. The maximum hourly observation was 16.5 ppm at the Boyd Park site in Missoula. The maximum eight hour observation was 13.3 ppm also at the Boyd Park site. There was one violation of the eight hour standard at the Boyd Park site but no violations at the Wrecking Yard site in Libby. Table 37 summarizes the carbon monoxide data for this region.

Respirable Particulates (PM15)

Particulate matter less than 15 microns (PM15) was monitored at two sites in Missoula County in 1984. The maximum 24-hour observation was 282 ug/m^3 at the Boyd Park site. The highest annual arithmetic mean was 50.8 ug/m^3 at Boyd Park. There is no standard for particulate matter using this method. Table 38 summarizes the PM15 data for this region.

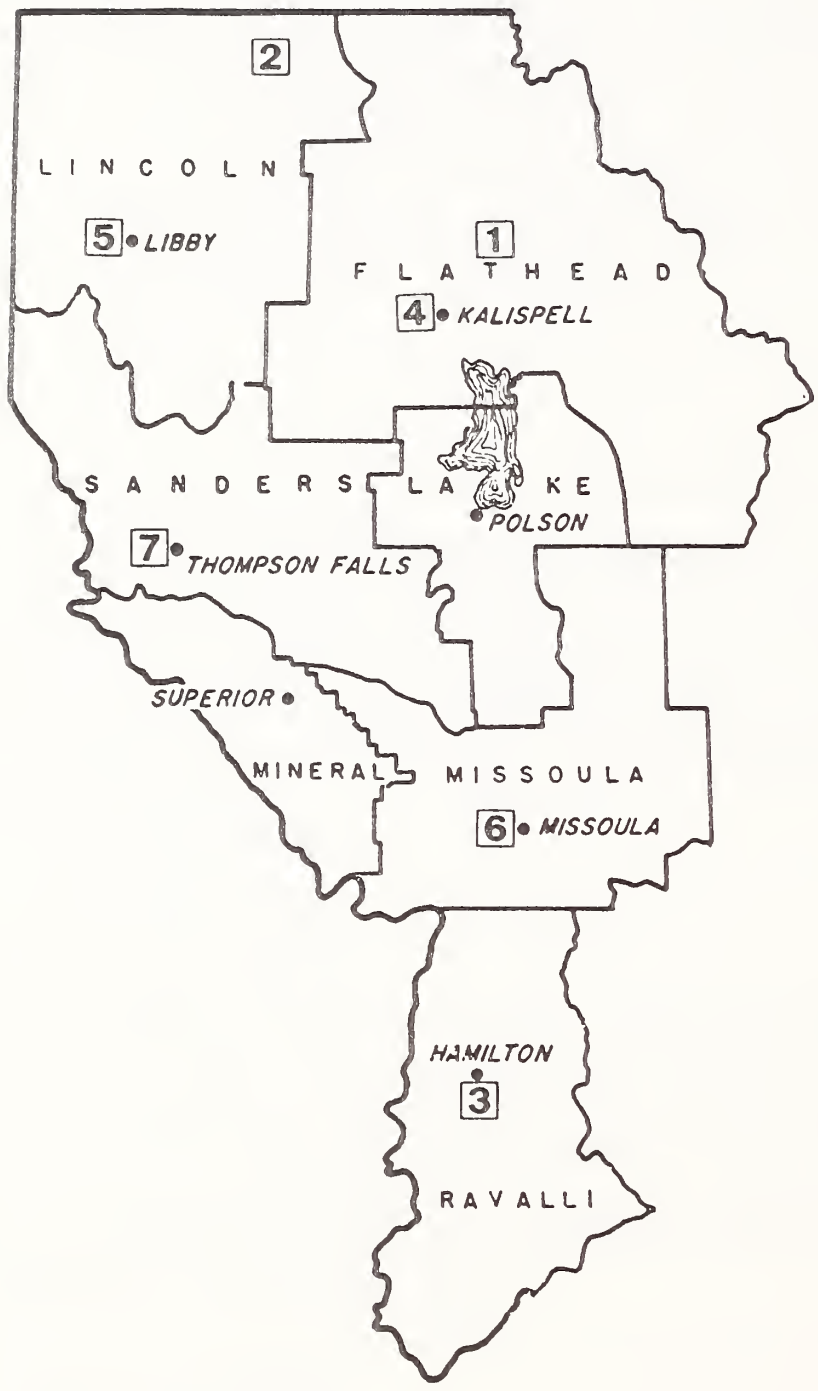
Respirable Particulates (PM10)

Particulate matter less than 10 microns (PM10) was monitored at two sites in Missoula County in 1984. The maximum 24-hour observation was 142 ug/m^3 at

the Rose Par site. The highest annual arithmetic average was 57.3 ug/m^3 at the Boyd Park si:e. There is currently no standard for PM10. The federal government will pr bably propose a standard in the next two years. Table 39 summarizes the M10 data for this region.

FIGURE

AQCR 144 - REGION MAP



MONITORING SITE LOCATIONS

1. Columbia Falls
2. Eureka
3. Hamilton
4. Kalispell
5. Libby
6. Missoula
7. Thompson Falls

TABLE 30a
AQCR 144 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
0270 005 P 01	ANDERS RESIDENCE, 726 FIRST STREET MONTANA AIR QUALITY BUREAU	CITY CENTER-RESIDENTIAL POPULATION ORIENTED	COLUMBIA FALLS FLATHEAD
0480 707 P 02	DOANE, NORTH HIGHWAY 93 MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	FLATHEAD
0480 708 P 02	HOFFMAN, 1/4 MILE SE OF HIWAY 2 MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	COLUMBIA FALLS FLATHEAD
0480 709 P 02	LIDDLE, SOUTH OF PLANT ACROSS THE RIVER MONTANA AIR QUALITY BUREAU	RURAL-AGRICULTURAL SOURCE ORIENTED	COLUMBIA FALLS FLATHEAD
0570 007 P 02	GLACIER NATL PARK # 5, FIRE WEATHER STATN MONTANA AIR QUALITY BUREAU	RURAL-UNCLASSIFIED SOURCE ORIENTED	FLATHEAD
0570 010 P 02	GLACIER NATL PARK # 8, ST MARY'S MONTANA AIR QUALITY BUREAU	RURAL-UNCLASSIFIED SOURCE ORIENTED	GLACIER
0800 015 P 01	UNIVERSAL ATHLETIC - 220 MAIN STREET MONTANA AIR QUALITY BUREAU	SUBURBAN-COMMERCIAL POPULATION ORIENTED	KALISPELL FLATHEAD
0800 017 P 01	COURTHOUSE EAST - 723 5TH AVE EAST MONTANA AIR QUALITY BUREAU	CITY CENTER-COMMERCIAL POPULATION ORIENTED	KALISPELL FLATHEAD
0900 010 P 01	BROWN RESIDENCE - 1119 DAKOTA MONTANA AIR QUALITY BUREAU	CITY CENTER-RESIDENTIAL POPULATION ORIENTED	LIBBY LINCOLN
0900 012 P 05	LINCOLN CO COURTHOUSE - 418 MINERAL AVE MONTANA AIR QUALITY BUREAU	CITY CENTER-COMMERCIAL SPECIAL STUDIES	LIBBY LINCOLN
0900 012 P 07	LINCOLN CO COURTHOUSE - COLOCATED MONTANA AIR QUALITY BUREAU	CITY CENTER-COMMERCIAL QA-COLOCATED SAMPLER	LIBBY LINCOLN
0900 013 P 05	RIVER SITE - N OF LIBBY MONTANA AIR QUALITY BUREAU	RURAL-NEAR URBAN SPECIAL STUDIES	LIBBY LINCOLN
0940 005 P 01	LINCOLN ELECTRIC CO-OP - S OF HIWAY 93 MONTANA AIR QUALITY BUREAU	RURAL-COMMERCIAL POPULATION ORIENTED	EUREKA LINCOLN
1100 001 G 01	COURTHOUSE ROOF - WOODY ST & WEST PINE MISSOULA CITY-COUNTY HEALTH DEPARTMENT	CITY CENTER-COMMERCIAL POPULATION ORIENTED	MISSOULA MISSOULA
1100 015 G 02	HOERNER WALDORF #1 - RAILROAD BLUFF MISSOULA CITY-COUNTY HEALTH DEPARTMENT	RURAL-INDUSTRIAL SOURCE ORIENTED	MISSOULA MISSOULA
1100 015 G 07	HOERNER WALDORF #1 - COLOCATED MISSOULA CITY-COUNTY HEALTH DEPARTMENT	RURAL-INDUSTRIAL QA-COLOCATED SAMPLER	MISSOULA MISSOULA

TABLE 30b
AQCR 144 - MONITORING SITE DESCRIPTIONS

AREA/SITE CODE	SITE NAME/ADDRESS SUPPORTING AGENCY	STATION TYPE PROJECT DESCRIPTION	CITY COUNTY
1100 016 G 02	HOERNER WALDORF #2 - WELL FIELD MISSOULA CITY-COUNTY HEALTH DEPARTMENT	RURAL-INDUSTRIAL SOURCE ORIENTED	MISSOULA MISSOULA
1100 020 G 01	ROSE PARK - 1/2 BLOCK FROM HIWAY 93 S MISSOULA CITY-COUNTY HEALTH DEPARTMENT	CITY CENTER-RESIDENTIAL POPULATION ORIENTED	MISSOULA MISSOULA
1100 024 G 02	BOYD PARK - 3100 WASHBURN MISSOULA CITY-COUNTY HEALTH DEPARTMENT	SUBURBAN-RESIDENTIAL SOURCE ORIENTED	MISSOULA MISSOULA
1100 024 G 07	BOYD PARK - COLOCATED MISSOULA CITY-COUNTY HEALTH DEPARTMENT	SUBURBAN-RESIDENTIAL QA-COLOCATED SAMPLER	MISSOULA MISSOULA
1100 025 G 01	NORTHSIDE - BEACON STREET MISSOULA CITY-COUNTY HEALTH DEPARTMENT	SUBURBAN-INDUSTRIAL POPULATION ORIENTED	MISSOULA MISSOULA
1100 029 G 01	MEADOW HILLS - BRIGGS & RESERVE MISSOULA CITY-COUNTY HEALTH DEPARTMENT	SUBURBAN-INDUSTRIAL POPULATION ORIENTED	MISSOULA MISSOULA
1100 030 G 01	SPURGIN & TOWER - SPURGIN RD & TOWER ST MISSOULA CITY-COUNTY HEALTH DEPARTMENT	SUBURBAN-INDUSTRIAL POPULATION ORIENTED	MISSOULA MISSOULA
1300 001 F 01	RAVALLI COUNTY COURTHOUSE - 205 BEDFORD MONTANA AIR QUALITY BUREAU	CITY CENTER-COMMERCIAL POPULATION ORIENTED	HAMILTON RAVALLI
1400 003 F 05	SANDERS CO COURTHOUSE - MAIN & MADISON MONTANA AIR QUALITY BUREAU	CITY CENTER-COMMERCIAL SPECIAL STUDIES	THOMPSON FALLS SANDERS

TABLE 31a

AQCR 144 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD	TP
0270 005 F 01	Anders Residence	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0480 707 F 02	Doane	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0480 708 F 02	Hoffman	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0480 709 F 02	Liddle	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0570 007 F 02	Fire Weather Station	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
0570 010 F 02	St. Mary	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
0800 015 F 01	Universal Athletics	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
0800 017 F 01	Courthouse East	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0900 010 F 01	Brown Residence	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0900 012 F 05	Lincoln County Courthouse	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0900 012 F 07	Lincoln Co. Crthse.-Colloc.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0900 013 F 05	River Site	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0900 016 F 05	Wrecking Yard	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0940 005 F 01	Lincoln Electric Co-op	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100 001 G 01	Courthouse Roof	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1100 015 G 02	Hoerner Waldorf #1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1100 015 G 07	Hoerner Waldorf #1-Collocated	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100 016 G 02	Hoerner Waldorf #2	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

TABLE 31b

AQCR 144 - POLLUTANT INVENTORY BY SITE - 1984

AREA/SITE	SITE NAME	TSP	B-S	AS	CD	CU	PB	ZN	F-P	F-V	NO3	SO4	CO	SO2	S-R	WS	WD	SD	TP
1100 020 G 01	Rose Park*	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1100 024 G 02	Boyd Park*	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
1100 024 G 07	Boyd Park-Collocated	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100 029 G 01	Meadow Hills	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100 030 G 01	Spurgin and Tower	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1300 001 F 01	Ravalli County Courthouse	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1400 003 F 05	Sanders County Courthouse	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Respirable Particulates (PM-15 and PM-10) were also monitored.

Key:

TSP - Total Suspended Particulates

B-S - Back Scatter (Visibility)

AS - Arsenic

CD - Cadmium

CU - Copper

PB - Lead

ZN - Zinc

F-P - Fluoride (Calcium Papers)

F-V - Fluoride (Vegetation)

NO_3 - Nitrate

SO_4 - Sulfate

CO - Carbon Monoxide

SO_2 - Sulfur Dioxide

S-R - Sulfation Rate

WS - Wind Speed

WD - Wind Direction

SD - Standard Deviation WD

TP - Temperature

TABLE 32a

AQCR 144 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Flathead/Columbia Falls								
0270 005 F 01	Anders Residence	82	60	241	225	186	85.4	67.0
		83	58	274	199	178	81.6	70.1
		84	60	437	407	302	115.1	90.6
Glacier Park								
0570 007 F 02	Fire Weather Station	82	47	51	46	42	15.9	12.3
		83	52	40	35	30	13.0	9.2
		84	48	129	58	49	15.3	9.0
0570 010 F 02	St. Mary	82	24	44	18	13	7.4	4.8
		83	47	33	31	29	11.4	7.7
		84	45	71	58	36	11.5	6.9
Flathead/Kalispell								
0800 015 F 01	Universal Athletic	82	59	234	232	201	85.0	73.6
		83	48	370	210	186	84.9	72.4
		84	39	209	196	152	80.7	73.3
0800 017 F 01	Courthouse East	82	--	--	--	--	---	---
		83	53	129	102	98	50.8	46.1
		84	59	160	133	130	53.8	46.5

TABLE 32b

AQCR 144 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Lincoln/Libby								
0900 010 F 01	Brown Residence	82	52	346	282	191	106.0	92.8
		83	52	278	250	210	108.1	96.3
		84	53	378	324	324	124.8	107.4
0900 012 F 05	Lincoln County Courthouse	82	--	--	--	--	---	---
		83	50	278	207	207	106.1	90.4
		84	54	463	364	354	121.7	102.5
0900 012 F 07	Lincoln County Courthouse - Collocated	82	--	--	--	--	---	---
		83	--	--	--	--	---	---
		84	16	281	194	142	114.6	103.1
Lincoln/Eureka								
0940 005 F 01	Lincoln Electric Co-op	82	--	--	--	--	---	---
		83	--	--	--	--	---	---
		84	33	349	276	149	86.1	64.2
Missoula/Missoula								
1100 001 G 01	Courthouse Roof	82	327	255	216	195	66.9	59.7
		83	340	316	313	278	70.7	60.3
		84	353	301	270	270	70.5	60.3
1100 015 G 02	Hoerner Waldorf #1	82	113	101	86	70	31.9	26.3
		83	104	80	69	68	29.5	25.8
		84	114	94	92	85	26.7	21.7

TABLE 32c

AQCR 144 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Missoula/Missoula								
1100 015 G 07	Hoerner Waldorf #1 - Collocated	82	45	65	64	63	32.0	27.5
		83	58	78	67	65	29.0	25.2
		84	60	54	52	49	25.0	21.5
1100 016 G 02	Hoerner Waldorf #2	82	118	109	105	83	33.1	26.7
		83	102	143	101	70	20.7	24.1
		84	119	102	99	89	26.8	20.3
1100 020 G 01	Rose Park	82	351	381	312	221	64.6	55.2
		83	347	422	346	280	67.7	55.9
		84	346	294	264	257	64.5	53.6
1100 024 G 02	Boyd Park	82	116	319	309	298	89.2	72.9
		83	139	366	336	321	88.3	72.7
		84	341	440	408	343	70.7	56.5
1100 024 G 07	Boyd Park - Collocated	82	--	--	--	--	---	---
		83	14	140	130	127	87.1	81.0
		84	115	330	255	224	67.8	55.8
1100 029 G 01	Meadow Hills	82	--	--	--	--	---	---
		83	25	139	111	106	66.9	62.0
		84	92	196	148	127	45.1	37.3

TABLE 32d

AQCR 144 - TOTAL SUSPENDED PARTICULATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean	Geom Mean
Missoula/Missoula								
1100 030 G 01	Spurgin and Tower	82	--	--	--	--	---	---
		83	29	125	112	98	51.7	45.8
		84	113	147	127	114	40.4	32.5
Ravalli/Hamilton								
1300 001 F 01	Ravalli County Courthouse	82	--	--	--	--	--	--
		83	43	181	164	126	66.6	58.6
		84	51	267	185	149	60.2	49.4
Sanders/Thompson Falls								
1400 003 F 05	Sanders County Courthouse	82	--	--	--	--	---	---
		83	45	358	260	257	89.8	72.3
		84	47	388	370	360	106.7	81.0

TABLE 33a

AQCR 144 - BETA (LIGHT) SCATTER

Scattering Coefficient (X 10**5)

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	Monthly Average
0900 013 F 05	Libby - River	83	01	---	---	---	---	---
			02	---	---	---	---	---
			03	---	---	---	---	---
			04	---	---	---	---	---
			05	---	---	---	---	---
			06	---	---	---	---	---
			07	---	---	---	---	---
			08	---	---	---	---	---
			09	414	36.6	34.5	33.2	8.8
			10	375	92.8	78.7	69.0	17.7
			11	599	61.7	59.5	58.2	18.4
			12	735	84.8	81.8	79.8	27.2
		ANNUAL		2123	92.8	84.8	81.8	19.4
0900 013 F 05	Libby - River	84	01	410	92.8	92.8	92.8	36.6
			02	---	---	---	---	---
			03	---	---	---	---	---
			04	---	---	---	---	---
			05	---	---	---	---	---
			06	---	---	---	---	---
			07	---	---	---	---	---
			08	---	---	---	---	---
			09	578	68.5	64.5	58.5	11.8
			10	717	80.5	77.5	72.5	16.3
			11	698	81.5	77.5	74.5	24.9
			12	---	---	---	---	---
		ANNUAL		2403	92.8	92.8	92.8	21.2

TABLE 33b

AQCR 144 - BETA (LIGHT) SCATTER

Scattering Coefficient (X 10**5)

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	Monthly Average
0900 016 F 05	Wrecking Yard	84	01	315	93.1	93.1	93.1	55.5
			02	672	92.7	92.7	92.7	56.8
			03	732	92.7	92.7	92.7	35.7
			04	---	---	---	---	---
			05	---	---	---	---	---
			06	---	---	---	---	---
			07	---	---	---	---	---
			08	---	---	---	---	---
			09	---	---	---	---	---
			10	---	---	---	---	---
			11	---	---	---	---	---
			12	---	---	---	---	---
		ANNUAL		1719	93.1	93.1	93.1	47.6

TABLE 34

AQCR 144 - NITRATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Glacier Park							
0570 007 F 02	Fire Weather Station	82	47	1.0	.8	.7	.3
		83	52	2.0	1.0	.9	.4
		84	48	1.8	1.7	1.0	.4
0570 010 F 02	St. Mary	82	24	3.2	2.8	2.0	.6
		83	49	2.9	1.1	1.0	.3
		84	45	3.2	1.3	0.8	.3
Flathead/Kalispell							
0800 015 F 01	Universal Athletic	82	59	3.0	2.9	2.7	1.0
		83	48	3.9	2.9	2.6	1.1
		84	40	3.1	1.7	1.5	.8

TABLE 35

AQCR 144 - SULFATES

Micrograms per Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Glacier Park							
0570 007 F 02	Fire Weather Station	82	47	8.3	5.9	5.5	1.6
		83	52	5.3	4.0	3.6	1.4
		84	48	3.8	2.9	2.8	1.2
0570 010 F 02	St. Mary	82	24	7.3	5.6	5.2	2.0
		83	49	6.2	4.2	3.0	1.4
		84	45	7.3	2.4	2.2	1.0
Flathead/Kalispell							
0800 015 F 01	Universal Athletics	82	59	9.0	7.9	7.1	3.0
		83	48	5.6	4.4	4.2	2.7
		84	40	4.7	4.4	4.1	2.5
Missoula/Missoula							
1100 015 G 02	Hoerner Waldorf #1	82	114	16.5	9.2	7.2	2.3
		83	107	6.0	5.8	5.6	3.2
		84	113	11.0	9.9	9.7	3.2
1100 016 G 02	Hoerner Waldorf #2	82	117	8.7	7.9	7.6	1.9
		83	101	7.0	6.0	5.7	2.7
		84	119	12.2	12.1	10.5	2.8
1100 020 G 01	Rose Park	82	119	9.8	7.7	7.4	2.6
		83	20	7.6	6.4	5.4	3.5
		84	78	10.3	7.5	6.8	3.7

TABLE 36

AQCR 144 - FLUORIDE (VEGETATION)

Micrograms per Gram

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Season Average
Flathead/Columbia Falls							
0480 707 F 02	Doane	82	5	18.0	8.0	5.5	7.9
		83	6	20.0	16.5	13.6	10.5
		84	6	57.5	19.5	15.5	19.2
0480 708 F 02	Hoffman	82	3	8.0	3.5	3.0	4.8
		83	6	21.3	17.0	12.5	11.8
		84	6	17.0	13.0	10.5	8.8
0480 709 F 02	Liddle	82	4	10.5	9.0	7.5	8.0
		83	6	27.7	25.4	23.6	17.0
		84	6	45.0	25.5	21.5	18.5

TABLE 37a

AQCR 144 - CARBON MONOXIDE

Parts Per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	8 Hr Max	Monthly Average
0900 016 F 05	Wrecking Yard	84	01	---	---	---	---	---	---
			02	672	9.0	8.5	8.0	6.7	2.4
			03	213	5.7	5.2	5.0	5.2	1.9
			04	---	---	---	---	---	---
			05	---	---	---	---	---	---
			06	---	---	---	---	---	---
			07	---	---	---	---	---	---
			08	---	---	---	---	---	---
			09	---	---	---	---	---	---
			10	---	---	---	---	---	---
			11	---	---	---	---	---	---
			12	---	---	---	---	---	---
		ANNUAL		885	9.0	8.5	8.0	6.7	---

TABLE 37b

AQCR 144 - CARBON MONOXIDE

Parts Per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	8 Hr Max	Monthly Average
1100 024 G 02	Boyd Park	82	01	733	10.6	10.5	10.5	9.2	2.5
			02	463	13.4	11.3	10.1	8.4	2.5
			03	619	9.0	4.3	3.5	2.0	.6
			04	702	3.4	3.3	3.0	2.2	.7
			05	210	1.4	.9	.9	.7	.1
			06	---	---	---	---	---	---
			07	---	---	---	---	---	---
			08	---	---	---	---	---	---
			09	---	---	---	---	---	---
			10	105	3.8	3.6	3.1	2.0	1.1
			11	705	8.0	8.0	7.6	5.3	1.8
			12	543	9.5	8.0	7.9	6.2	1.5
		ANNUAL		4080	13.4	11.3	10.6	9.2	---
1100 024 G 02	Boyd Park	83	01	734	15.1	14.5	13.2	9.3	2.5
			02	578	8.2	8.2	7.6	6.0	1.6
			03	---	---	---	---	---	---
			04	---	---	---	---	---	---
			05	---	---	---	---	---	---
			06	---	---	---	---	---	---
			07	---	---	---	---	---	---
			08	---	---	---	---	---	---
			09	---	---	---	---	---	---
			10	---	---	---	---	---	---
			11	---	---	---	---	---	---
			12	---	---	---	---	---	---
		ANNUAL		1312	15.1	14.5	13.2	9.3	---

TABLE 37c

AQCR 144 - CARBON MONOXIDE

Parts Per Million

Site Code	Site Name/Location	Yr	Mo	Num Obs	Max Obs	2nd Max	3rd Max	8 Hr Max	Monthly Average
1100 024 G 02	Boyd Park	84	01	666	16.5	15.0	14.8	13.3	2.5
			02	692	13.0	12.5	9.5	7.1	1.3
			03	732	9.7	8.0	6.3	3.3	0.3
			04	702	2.1	1.7	1.5	1.3	0.1
			05	737	2.7	2.1	1.6	1.1	0.2
			06	712	1.0	0.9	0.7	0.4	0.2
			07	519	1.1	0.7	0.7	0.2	0.0
			08	616	3.1	2.4	2.3	1.7	0.2
			09	714	3.8	3.6	3.4	2.6	0.5
			10	740	10.4	8.2	6.8	3.7	1.3
			11	710	9.1	8.3	7.3	5.5	1.6
			12	740	10.0	8.7	8.6	6.9	2.1
		ANNUAL		8280	16.5	15.0	14.8	13.3	---

TABLE 38

AQCR 144 - RESPIRABLE PARTICULATE (PM15)

Micrograms/Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Missoula/Missoula							
1100 020 G 01	Rose Park	82	--	--	--	--	--
		83	4	62	44	43	43.7
		84	76	164	160	142	41.8
1100 024 G 02	Boyd Park	82	--	--	--	--	--
		83	5	142	132	74	90.8
		84	78	282	188	187	50.8

TABLE 39

AQCR 144 - RESPIRABLE PARTICULATE (PM10)

Micrograms/Cubic Meter

County/City Site Code	Site Name/Location	Yr	Num Obs	Max Obs	2nd Max	3rd Max	Arith Mean
Missoula/Missoula							
1100 020 G 01	Rose Park	82	--	--	--	--	--
		83	--	--	--	--	--
		84	22	142	109	107	51.7
1100 024 G 02	Boyd Park	82	--	--	--	--	--
		83	--	--	--	--	--
		84	20	138	127	116	57.3

APPENDIX A

Glossary of Air Quality Terms

APPENDIX A

GLOSSARY OF AIR QUALITY TERMS

ABSORPTION
(Engineering) The process of dissolving a gas or one of a mixture of gases in a liquid
(Bio-medical) The taking up of fluids or other substances by the skin, mucous surfaces, or absorbent vessels

ACID MIST
A mist of fine aqueous droplets which contain dissolved acidic compounds, such as sulfuric acid.

ACOUSTIC RADAR
A sounding device used to determine the mixing height.

ADIABATIC LAPSE RATE
The change of temperature with height of a parcel of dry air if it is lifted or lowered, with no loss or gain of heat.

ADSORPTION
The adhesion in an extremely thin layer of the molecules of gases or dissolved substances, or liquids, to the surfaces of bodies with which they are in contact.

AEROSOL
Suspended particulate matter consisting of smoke, dusts, and fumes which are either solid or droplets of liquids. Aerosol particles vary in size from well below one micron to approximately 100 microns in diameter.

AMBIENT AIR
That portion of the atmosphere, external to buildings, to which the general public has access.

AMBIENT AIR QUALITY
A physical and chemical measure of the concentration of various chemicals in the ambient atmosphere. The quality is usually determined over a specific time period.

ANTHRACITE
A type of a coal, hard, with high luster, which contains little volatile matter distinguishing it from bituminous coal.

AROMATIC
In organic chemistry, designating a large class of organic compounds which contain benzene rings. The simplest aromatic compound is benzene.

ASTM

ASTM (American Society for Testing Materials) is a voluntary organization of companies and individuals, established for the purpose of setting up standard methods of testing, so that different individuals can obtain comparable test results upon the same sample. ASTM standard test methods are available for almost all types of materials, including some air pollutants. An ASTM Apparatus is the specific apparatus designated by ASTM for a specific test.

ATMOSPHERIC PRESSURE (Also called barometric pressure)

The pressure exerted by the atmosphere as a consequence of gravitational attraction exerted upon the "column" of air lying directly above the point in question. As with any gas, the pressure exerted by the atmosphere is ultimately explainable in terms of bombardment by gas molecules; it is independent of the orientation of the surface on which it acts.

Atmospheric pressure is one of the basic meteorological elements. It is measured by many varieties of barometer, and is expressed in several units systems. The most common unit used is the millibar (one millibar equals 1000 dynes per cm^2). Unique to the science of meteorology is the use of inches (or millimeters) of mercury; that is, the height of a column of mercury that exactly balances the weight of the column of atmosphere whose base coincides with that of the mercury column. Also employed are units of weight per area and units of force per area. A standard atmosphere has been defined in terms of equivalence to each of the above unit systems, and it is used as a unit itself.

ATTAINMENT AREA

A geographic area in which the quality of the air is better than federal air pollution standards. PSD requirements apply to attainment areas.

ATOMIZING SCRUBBER

A wet collector in which use is made of a liquid medium to increase the size of aerosol particles to facilitate its removal from a gas stream. In an atomizing scrubber, water is introduced at the throat of a venturi through which gas (containing aerosol particles) is moving at high velocity. Units of this type have a high pressure drop, and are used to get high removal efficiencies for particles of relatively small diameters (e.g., below 1.5 microns).

BACT - "Best Available Control Technology"

The term best available control technology means an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this Act emitted from or which results from any major emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of each such pollutant. (Clean Air Act, Section 169(3))

BART - "Best Available Retrofit Technology"

An emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant which is emitted by an existing stationary facility. The emission limitation must be established, on a case-by-case basis, taking into consideration the technology available, the costs of compliance, the energy and nonair quality environmental impacts of compliance, any pollution control equipment in use or in existence at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology.

BAGHOUSE

An enclosure containing many cloth bag filters. Dust laden air entering at the top or bottom of a bag is discharged through the cloth directly to the atmosphere while the solid particles are deposited inside the bag.

BITUMINOUS

A type of coal, soft, which yields considerable volatile matter when heated. Burning this type of coal in open fireplaces or household stoves has caused serious air pollution problems (London, formerly in Pittsburgh and Saint Louis) because of the lack of sufficient temperature above the firebed to burn the volatilized gases and tars (i.e. both gaseous and particulate emissions).

BRONCHITIS

Inflammation of the bronchial tubes (wind pipe), which includes the bronchi (s. bronchus) and the choncia (s. bronchium) and through which air passes to the lungs.

BULK DENSITY

The quotient of the total mass of a mixture (usually liquid plus solid or gas plus solid) divided by the total volume.

CARBON DIOXIDE (CO_2)

A colorless, odorless, incombustible gas, used to make carbonated beverages, dry ice, etc. It is a product of respiration, combustion, fermentation, decomposition and other natural processes, and is always present in the atmosphere.

CASCADE IMPACTOR

A device for separating dust particles from a moving air stream. In principle a dust particle collides or impacts on a solid surface and thus is collected while the air stream moves around the solid surface. An assembly of a series of such surfaces is called a cascade impactor.

CHROMATOGRAPHY

A technique used by chemists to cause the separation of small amounts of chemical compounds in order to determine their identity and quantity.

CIRCULATION PATTERN

The general geometric configuration of atmospheric circulation at a given time and region.

CLASS I AREA
Any area which is designated for the most stringent degree of protection from future degradation of air quality. The Clean Air Act designates as mandatory Class I areas each national park over 6,000 acres and each national wilderness area over 5,000 acres.

CLASS II AREA
Any area cleaner than federal air quality standards which is designated for a moderate degree of protection from future air quality degradation. Moderate increases in new pollution may be permitted in a Class II area.

CLASS III AREA
Any area cleaner than federal air quality standards which is designated for a lesser degree of protection from future air quality degradation. Significant increases in new pollution may be permitted in a Class III area.

CLEAN AIR ACT
A law enacted by Congress to protect and enhance the quality of the nation's air resources so as to promote the public health and welfare and the productive capacity of its population.

CRITERIA POLLUTANT
A pollutant for which EPA has established a national ambient air quality standard under Section 109 of the Clean Air Act. Present criteria pollutants are: carbon monoxide, hydrocarbons, lead, nitrogen dioxide, ozone, sulfur dioxide and total suspended particulate.

CLOTH FILTER
A cloth bag filter; see BAGHOUSE

COLLECTION EFFICIENCY
The ratio of the weight fraction of aerosol which is retained in the collector to that which entered the collector. Collection efficiency could be specified in terms of particle numbers or other physical characteristics for special cases.

COMBUSTION
The rapid reaction of carbon containing substances (or other oxygen demanding materials) with oxygen producing a rapid temperature increase and a flame.

COMBUSTION CHAMBER
That part of a furnace or incinerator in which burning takes place.

CONING
A name which describes the approximate shape of a smoke plume in a neutral atmosphere (see FANNING).

CONVECTION
(In meteorology) a mechanical process thermally produced involving the upward and downward transfer of a limited portion of the atmosphere.

CYCLONE COLLECTOR
A device for separating solid particles from gases or liquids. The carrier gas or liquid is made to move in a rapid spiralling motion (cyclonic) throwing the solids by centrifugal force to the walls of the collector.

DEPOSITION VELOCITY
The minimum velocity of a small particle suspended in a moving air stream that will give the particle sufficient momentum to carry it into a target (deposit the particle on a collecting surface). At lower velocities the particle will remain in the air stream and go around the target.

DEW POINT (or dew point temperature)
The temperature to which a given parcel of air must be cooled at constant pressure and constant water vapor content in order for saturation to occur.

DISPERSION
The action of mixing air containing a high concentration of pollutants arising from a pollutant source with the ambient air thereby reducing the ambient pollutant concentration.

DUST COLLECTORS
Any device used to remove particulate matter from exhaust streams

DUSTFALL
The amount of large particulate matter deposited per unit time per unit area of surface.

ELECTROLYTIC BATH
A container of liquid or molten materials through which an electric current is passed to cause chemical decomposition.

ELECTROSTATIC PRECIPITATOR
A device for collecting dispersed particles. Particle laden air is passed between two surfaces carrying a high electric potential and under the force of the electric field the particles are driven to a collecting electrode and precipitated.

EMPHYSEMA
The presence of air in the alveolar tissue of the lungs due to rupture of the alveoli. Progressive development of this condition leads to enlargement of the lungs and the chest cavity simultaneously with reduced capacity for breathing and efficiency of breathing.

FANNING
The characteristic appearance of a smoke plume emitted under extreme inversion conditions, where little vertical mixing of smoke in the atmosphere takes place (see CONING).

FLUE GASES
All the gases discharged from any stationary combustion process

FLUE GAS DESULFURIZATION
One of several processes by which sulfur dioxide is removed from the flue gas as a disposal solid, elemental sulfur or sulfuric acid.

FLUORIDE
The generic name of all simple chemical compounds containing fluorine, as sodium fluoride.

FLUORINE
A nonmetallic chemical element, a pale yellow, highly corrosive and toxic gas.

FLUOROSIS
Chronic poisoning by fluorides

FLY ASH
The non-combustible particles contained in flue gas.

FOSSIL FUELS
Oil, coal or natural gas

FREE LIFT
The actual lifting force of an inflated balloon, usually expressed in grams. The free lift plus the weight of the balloon and attached equipment is the total lift.

FUME
A fume is formed by sublimation of solid particles from the gaseous state. The term is frequently used to describe suspensions of very small (submicron) particles.

GASIFICATION
The process of converting solid or liquid fossil fuels to gaeous fuel, usually with the elimination of sulfur.

GRAVITY SETTLING
The application of gravitational force to cause solid particles to drop out of the air. Practically it is useful for removing only particles larger than 50 microns in size.

HALOGEN
Any of the five very active, nonmetallic chemical elements: fluorine, chlorine, bromine, iodine, and astatine.

HYDROCARBON
Any of the class of compounds consisting solely of hydrogen and carbon.
1. paraffins whose molecules contain the maximum possible of hydrogen.
2. aromatics, whose molecules contain benzene rings.
3. naphthenes, whose molecules are ring shaped.
4. olefins, whose molecules contain double bonds.

HYDROFLUORIC ACID
A water solution of hydrogen fluoride. In the gaseous state, hydrogen fluoride is colorless, corrosive, and poisonous.

HYDROGEN
The most simple chemical element and the lightest of all gases. It is found chiefly combined with oxygen to form water; also found in acids, bases, hydrocarbons, etc.

INCINERATORS

Any device to burn solid and combustible liquid residues or wastes in order to reduce their bulk. The ash residue may be used for landfill or dumped at sea. Flue fed incinerators are those where the garbage or refuse is supplied to the combustion chamber through the same flue used for discharge of the products of combustion. A power generating or combination incinerator is one in which the heat from refuse combustion is used to generate steam. Primary air is usually supplied with the material being burned. Secondary air is usually supplied to complete combustion of incompletely burned gaseous fractions over the fuel bed. Tertiary air may be supplied to further improve combustion in a secondary chamber.

INCREMENTS

The amount of additional pollution, beyond already existing background levels, which may be allowed in a particular PSD area. The size of allowable increment varies with whether the area is Class I, Class II or Class III.

INVERSION

A meteorological condition in which the temperature of the atmosphere rises with increased elevation instead of falling; a negative temperature lapse rate.

INVERSION LAYER

A layer in the atmosphere through which the temperature remains constant or increases with altitude.

ICAP - Inductive Coupled Argon Plasma

Measurement of emission spectra which is excited by radiofrequency in a plasma. The emissions from analytes will produce signals on photomultiplier tube.

INTEGRAL VISTA

A view perceived from within the mandatory Class I Federal area of a specific landmark or panorama located outside the boundary of the mandatory Class I Federal area.

ISOKINETIC

Having the same speed and direction. When sampling gas streams for certain purposes it is important that the gas flow into the sampler be of the same speed and direction as the main gas stream. This is called isokinetic sampling.

LAER - Lowest Achievable Emission Rate

A requirement applying to proposed new or modified major stationary sources in nonattainment areas. LAER means the "rate of emissions which reflects

a. The most stringent emission limitation which is contained in the (SIP) of any state for such class or category of source.... or
b. the most stringent emission limitation which is achieved in practice..., whichever is more stringent.

LAPSE RATE
The change in an atmospheric variable, usually temperature, with height.

LIGNITE
A naturally occurring coal-like material often having a distinct woody texture.

MACROMETEOROLOGY
Large-scale weather events as opposed to local micrometeorological events.

MERCAPTAN
One of a class of sulfur-containing organic chemical compounds (R-SH), which have an extremely offensive odor.

METEOROLOGY
The science dealing with the atmosphere and its phenomena, particularly relating to weather.

METHANE
The first of the series of hydrocarbons (CH). It is a colorless, odorless, flammable gas and is the chief constituent of natural gas.

MICROMETEOROLOGY
The science of small-scale weather events.

MICRON (MU)
A metric unit of measure of length equal to one millionth of a meter and to one thousandth of a millimeter. This unit is often used for describing sizes of airborne particles and is commonly designated by the Greek letter u (mu).

MIXING HEIGHT (or mixing depth)
The thickness of the atmospheric layer, measured from the surface upward, through which pollutants are presumed to mix by virtue of convection caused by daytime heating at the surface. The designation of mixing height implies the existence of an inversion, in which case the mixing height is also the height of the inversion base.

NECROSIS
Gradual decay in trees or plants

NESHAPS - National Emission Standards for Hazardous Pollutants
EPA has adopted emission standards for sources of asbestos, beryllium, vinyl chloride, and mercury.

NITROGEN OXIDES
Compounds of nitrogen including N_2O, NO, NO_2, NO_3, N_2O_3, N_2O_4, N_2O_5. Those most commonly encountered in the atmosphere are nitrous oxide (N_2O), a normal constituent of the air, and nitric oxide (NO) and nitrogen dioxide (NO_2) which are classified as pollutants.

NONATTAINMENT AREA
A geographic area in which the quality of the air is worse than federal air pollution standards. PSD requirements do not apply in nonattainment areas.

NSPS - New Source Performance Standards
EPA emission standards for certain categories of new or modifed air pollutant sources.

OPACITY
A measurement of visible emissions defined as the degree, expressed in percent, to which emissions reduce the transmission of light and obscure the view of an object in the background.

OXIDANT
Any chemical element or compound which will cause any other element to increase in positive valence in a chemical reaction. Less precisely, any chemical element or compound, e.g. NO_2, including oxygen which has the same effect as oxygen in a chemical reaction. In photochemical smog, the sum of all compounds detected by reaction with reducing agent, e.g., potassium iodide solution.

OZONE
A form of oxygen, O_3, having three atoms of oxygen to the molecule. It is found in the atmosphere in minute quantities and is a powerful oxidizing agent. It is a toxic constituent of photochemical smog.

PARAFFINS
A class of saturated hydrocarbons characterized by their chain-like molecular structure. See HYDROCARBON.

PARTICLES
Any solid matter emitted by a pollutant source. It is composed of settleable matter (which will settle as dust within a reasonable period of time) and suspended matter (which remains suspended in the atmosphere until washed out by precipitation, deposited by impaction, or some other process).

PARTICULATE MATTER
Finely divided solids or liquids. See AEROSOL.

PHOTOCHEMICAL SMOG
Air pollution resulting from light-induced reaction between certain organic materials and nitrogen dioxide.

PILOT BALLOON
A small balloon whose ascent is followed by a theodolite in order to obtain data for the computation of the speed and direction of winds in the upper air.

PILOT-BALLOON OBSERVATION (Commonly pibal)

An observation method for winds aloft; that is, the determination of wind speeds and directions in the atmosphere above a station. This is done by reading the elevation and azimuth angles of a theodolite while visually tracking a pilot balloon.

The ascension rate of the balloon is approximately determined by careful inflation to a given total lift. After release from the ground, periodic readings (usually at one-minute intervals) of elevation and azimuth angles of the balloon are recorded. These data are transferred to a winds-aloft plotting board, and the wind speed and direction at selected levels are calculated by trigonometric methods.

PREVAILING WIND DIRECTION (or prevailing wind)

The wind direction most frequently observed during a given period. The periods most frequently used are the observational day, month, season and year.

PSD - Prevention of Significant Deterioration

A planning and management process under Sections 160 through 169 of the CAA for allocation and use of air resources.

RADIATION INVERSION

A type of atmospheric inversion occurring usually at night when the earth's surface loses heat by radiation, thus cooling the layer of air next to the ground. See INVERSION.

RESIDUAL FUEL OIL

The remainder after the more valuable petroleum gas, gasoline, lubricants, paraffin waxes and asphalt are removed from petroleum. This heavy oil is used as fuel and is graded number 4, 5, or 6, with the heavier grades bearing higher numbers. These grades are also cheaper and usually contain more sulfur. The amount of sulfur in the "RESID" depends on the feed stock (source of the crude oil) and the use of dehydrosulfurization processes.

RINGLEMANN CHART

A chart showing four numbered shades of gray as well as pure white and all black, used by visual comparison for estimating the density of smoke as it emerges from a stack. The matched comparison with the chart is referred to as a Ringlemann Number.

SCATTERING COEFFICIENT

Amount of back scatter of light due to suspended particulate matter in the air and relates the measurement to visibility and the level of particulates.

SCRUBBER

Any device in which an aerosol is removed from a gas stream by a liquid droplet.

SETTLING CHAMBER
A simple particulate control device which consists of a large expansion in a flue or duct which results in a reduced pollutant velocity and subsequent particulate settling. The settled particulate is then mechanically removed from the chamber.

SETTLING VELOCITY
The speed at which an object will move through its surroundings under the force of gravity.

SIP - State Implementation Plan
A state developed, federally approved plan for implementing and enforcing requirements of the CAA.

SMOG
A combination of smoke and fog, usually generated as a result of atmospheric contamination. London (England) type smog arises as a result of the combined presence of sulfur oxides and particulates in a humid environment. Los Angeles smog or photochemical smog occurs when sunlight generated reactions involving hydrocarbon, ozone and nitrogen oxide take place. The smog is most visible when high concentrations of water vapor occur in the atmosphere simultaneously but may appear as a bluish haze in a dry atmosphere.

SOLAR RADIATION
The total electromagnetic radiation emitted by the sun.

SOOT
Aggregated particles of unburned carbon produced by incomplete combustion. The soot may contain sufficient amounts of sulfur oxides or compounds to damage paint or enamel finishes.

SPRAY CHAMBER
The simplest type of gas scrubber. Gas is passed countercurrent to falling drops of liquid (usually water) from a bank of spray nozzles. A typical appliction is the removal of fly ash and cinders from flue gases.

STABLE
Pertaining to the atmosphere or an atmospheric layer in the condition of static stability, that is, an atmosphere whose temperature lapse rate and moisture distribution is such as to suppress vertical exchange of air.

STAGNATION
With respect to air pollution, the persistence of a given volume of stable air over a region, permitting an abnormal buildup of pollutants from sources within the region.

STATIC STABILITY (Also called hydrostatic stability, vertical stability, convective or convectional stability)
The state of the atmosphere when it is stable relative to vertical displacements. Such an atmosphere tends to remain stratified, in that any air that is displaced vertically is subjected to a buoyant force that tends to restore it to its original level.

Static stability is determined primarily by the temperature lapse rate; an inversion layer is an extreme example of a statically stable layer.

STOICHIOMETRIC
In the exact combining proportions of materials involved in a specific chemical reaction.

SUBSIDENCE INVERSION
An atmospheric inversion due to the downward motion or air, about a stationary high-pressure area with concomitant adiabatic temperature rise. Such an inversion is common to Southern California in the warm months of the year. See INVERSION.

SURFACE INVERSION (or ground inversion)
A temperature inversion based at the earth's surface; that is, an increase of temperature with height beginning at the ground level.

This condition is due primarily to greater loss of heat due to radiation at and near the surface than at levels above. Thus, surface inversions are common over land prior to sunrise and in winter over high-latitude continental interiors.

SYNERGISM
Cooperative action of discrete pollutants such that the total effect is greater than the sum of the two effects taken independently.

TEMPERATURE INVERSION
A layer in which temperature increases with altitude. The principal characteristic of an inversion layer is its marked static stability, so that very little turbulent exchange can occur within it. Strong wind shears often occur across inversion layers, and abrupt changes in concentrations of atmospheric particulates and atmospheric water vapor may be encountered on ascending through the inversion.

When, in meteorological literature and discussion an "inversion" is mentioned, a temperature inversion is usually meant.

THEODOLITE
An optical instrument which consists of a sighting telescope mounted so that it is free to rotate around horizontal and vertical axis and graduated scales so that the angles or rotation may be measured. The telescope is usually fitted with a right-angle prism so that the observer continues to look horizontally into the eyepiece, whatever the variation of the elevation angle. In meteorology, the theodolite is used principally to observe the motion of a pilot balloon.

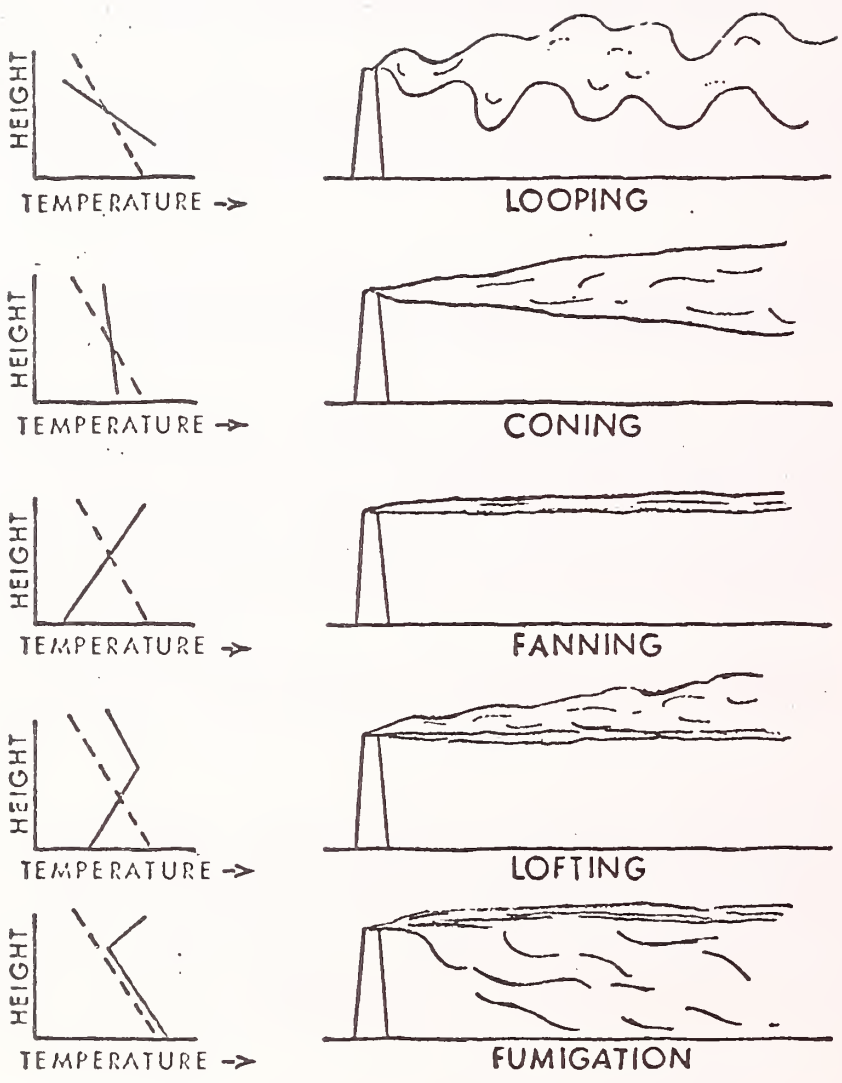
TOTAL LIFT
The upward force produced by the gas in a balloon. It is equal to the sum of the free lift, the weight of the balloon, and the weight of auxiliary equipment carried by the balloon.

WET COLLECTORS
Dust collectors which operate by contacting the dust with a liquid (usually water). The class includes spray chambers and atomizing scrubbers.

WIND
Air in motion relative to the surface of the earth. Since vertical components of atmospheric motion are relatively small, especially near the surface of the earth, meteorologists use the term to denote almost exclusively the horizontal component. Vertical winds are always identified as such.

WIND ROSE
A diagram showing the wind direction and speed and their variations for a day, a month, or any other specified period of time, for a specific location and altitude.

WIND VANE
An instrument used to indicate wind direction.


HEIGHT
TEMPERATURE
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TEMPERATURE
FUMIGATION

APPENDIX B

Ambient Air Quality Standards

APPENDIX B

AMBIENT AIR QUALITY STANDARDS

In December, 1977, the Montana Board of Health and Environmental Sciences directed the Air Quality Bureau to propose an administrative rule containing new enforceable ambient air quality standards.

A set of standards had been on the books for ten years; however, they were considered as goals or guidelines rather than enforceable standards.

It was decided that before new standards were adopted there should be a thorough review to determine whether the old standards were still appropriate or whether scientific research completed since their adoption indicated different standards were necessary.

Subsequently, $147,000 was provided to hire a staff and consultants. This study was called the Montana Ambient Air Quality Standards Study (MAAQS).

As a result of this work a draft environmental impact statement was published in January, 1979; a final statement in February, 1980.

After several public hearings and testimony from numerous "experts", the Board of Health and Environmental Sciences adopted a set of "enforceable" standards in August, 1980. Table AP-B-I lists the Montana and national ambient air quality standards. Additional information about the standards is provided on the following page.

Table AP-B-I

MONTANA AND NATIONAL AIR QUALITY STANDARDS

POLLUTANT	MONTANA STANDARD	FEDERAL PRIMARY STANDARD	FEDERAL SECONDARY STANDARD
Total Suspended Particulates	75 ug/m^3 annual average 200 ug/m^3 24-hr average*	75 ug/m^3 annual geometric mean 260 ug/m^3 24-hr average*	60 ug/m^3 annual geometric mean 150 ug/m^3 24-hr average*
Sulfur Dioxide	0.02 ppm annual average 0.10 ppm 24-hr average* 0.50 ppm 1-hr average**	0.03 ppm annual average 0.14 ppm 24-hr average*	0.5 ppm 3-24 average*
Carbon Monoxide	9 ppm 8-hr average* 23 ppm hourly average*	9 ppm 8-hr average* 35 ppm 1-hr average*	9 ppm 8-hr average*
Nitrogen Dioxide	0.05 ppm annual average	0.05 ppm annual average	0.05 ppm annual average
Photochemical Oxidants (ozone)	0.10 hourly average*	0.12 ppm 1-hour average*	0.12 ppm 1-hr average*
Lead	1.5 ug/m^3 90-day average	1.5 ug/m^3 calendar quarter average	None
Foliar Fluoride	35 ug/g grazing season average 50 ug/g monthly average	None	None
Hydrogen Sulfide	0.05 ppm hourly average*	None	None
Settled Particulate (Dustfall)	10 gm/m^2 30-day average	None	None
Visibility	Particle scattering coefficient of 3 x 10^{-5} per meter annual average***	None	None

*Not to be exceeded more than once per year
ug/m^3 micrograms pollutant per cubic meter of sampled air
ppm parts pollutant per million parts of sampled air
**Not to be exceeded more than 18 times per year
***Applies to PSD mandatory Class I areas

Air quality standards have been developed at the National level for six classes of air pollutants and at the State level for nine pollutants plus visibility. Below is a synopsis of each of the pollutants.

Sulfur Dioxide - Sulfur dioxide originates from the burning of fossil fuels such as coal or oil and the smelting of metals ores. The pollutant is known for causing significant loss in crop yield, rusting metals, reducing visibility and causing irritation of eyes, nose, throat and lungs.

Particulate Matter - Particulate matter may originate from natural sources such as forest fires and erosion, or result from automobiles, industrial processes, unpaved roads, agriculture, construction and other human activities. These tiny particles can damage paint, reduce visibility, and carry poisonous chemicals into the lungs causing cellular damage.

Carbon Monoxide - Carbon monoxide is a by-product of the incomplete combustion of organic fuels. The most notorious source is the automobile. This odorless gas can, in small amounts, cause headaches, dizziness, fatigue and slow reactions. It can be especially dangerous for people with heart disease. In larger amounts it can cause death.

Photochemical Oxidants (Ozone) - Photochemical oxidants are produced in the atmosphere when hydrocarbons and nitrogen oxides, combustion wastes from gasoline and other fuels, are exposed to sunlight. Oxidants irritate the eyes, nose, and throat, make breathing difficult, reduce visibility, and damage vegetation.

Hydrocarbons - Hydrocarbons are the unburned chemicals from the combustion or evaporation of organic compounds. Automobile exhaust and uncontained storage of petroleum products are common sources of hydrocarbons. They have been known to cause vegetative damage and contribute to photochemical oxidants.

Nitrogen Oxides - Nitrogen oxides usually originate in high-temperature combustion processes including diesel engines. It is not only a component of photochemical oxidants, but causes an unpleasant smelling brown haze, and is irritating to the nose and throat.

Fluoride - Sources of fluorides include the aluminum, glass, brick, fertilizer and, to a smaller degree, the oil industries. In excessive amounts, fluorides can cause bone deformities and damage vegetation.

Lead - Lead in the air is generally the result of automobiles and ore smelters. Physical problems of high lead content include gastrointestinal cramps, central nervous system effects, kidney disease and anemia.

Hydrogen Sulfide - Sources of hydrogen sulfide, the "rotten egg" pollutant include sewage treatment, kraft pulp and oil industries. The pollutant can damage paint, tarnish copper, injure vegetation, produce a losss of the sense of smell, cause severe respiratory tract irritation and in large doses, cause death.

Visibility - Visibility reductions are due to the amounts of TSP, aerosols and gases present in the atmosphere.

CONVERSION FACTORS

SO_2 1 PPM = 2,620 UG/M^3

H_2S 1 PPM = 1,400 UG/M^3

NO_2 1 PPM = 1,880 UG/M^3

NO 1 PPM = 1,227 UG/M^3

O_3 1 PPM = 1,960 UG/M^3

CO 1 PPM = 1,150 UG/M^3

APPENDIX C

Attainment Nonattainment Designations

APPENDIX C

ATTAINMENT-NONATTAINMENT DESIGNATIONS

Introduction

The 1977 Clean Air Act Amendments, enacted by Congress August 7, 1977, contained many new and expanded requirements regarding the control of air pollution. One of the most significant requirements was to classify areas of the state according to whether they met the National Ambient Air Quality Standards (NAAQS). The Department classified each area of the state into one of three categories: attainment - meeting the standards, nonattainment - exceeding the standards, or unclassified - insufficient information to determine the status. The areas which were designated nonattainment were required to develop revised State Implementation Plans to control emissions and bring the areas into compliance.

Classification Requirements

Five classifications were possible - three for particulate matter (PM) and sulfur dioxide (SO_2) and two for pollutants other than particulate matter or sulfur dioxide. The five classifications are summarized below.

A) Do not meet a national primary ambient air quality standard for oxidants, carbon monoxide (CO) or nitrogen dioxide (NO_2).

B) Do not meet, or in the judgment of the State will not attain or maintain in the time required by the applicable SIP, any national primary ambient air quality standard for sulfur dioxide or particulate matter.

C) Do not meet a national secondary ambient air quality standard.

D) Cannot be classified as B or C, on the basis of available information, for PM or SO_2.

E) Have ambient air quality levels better than any national primary or secondary ambient air quality standard for oxidants, CO or NO_2, or for which there is insufficient data to be classified A or C.

Areas designated as A, B or C were referred to as nonattainment areas, and areas designated as D or E were referred to as attainment (or unclassified) areas.

Air Quality Data

The Department used, whenever possible, the last four consecutive quarters of air quality data to propose the designations. Data was available from two ozone sites, two nitrogen oxides sites, three carbon monoxide sites, eleven sulfur dioxide sites, and fifty total suspended particulate sites.

Designation Proposal

On January 6, 1978, the Department submitted to EPA a proposed attainment/nonattainment designation document. The table which follows is a summary of that document. It should be noted that rural areas (<50,000 pop.) with high total suspended particualte concentrations were not designated nonattainment if the primary cause of the violations was uncontaminated (non-industrial) fugitive dust.

TABLE AP-C-I

ATTAINMENT STATUS

1. Oxidants

The Department proposed that the entire state be unclassified for oxidants.

2. Nitrogen Oxides

	Designation		
Designated Area	107(d)(1)(A) Nonattainment	107(d)(1)(E) Unclassified	107(d)(1)(E) Attainment
Billings, MT area			*
Colstrip, MT			*
Butte, MT		*	
Rest of State		*	

3. Carbon Monoxide

	Designation		
Designated Area	107(d)(1)(A) Nonattainment	107(d)(1)(E) Unclassified	107(d)(1)(E) Attainment
Billings Downtown Area	*		
Butte Area		*	
Colstrip Area		*	
Great Falls		*	
Missoula Area	*		

TABLE AP-C-I (Continued)

ATTAINMENT STATUS

4. Sulfur Dioxide

Designated Area	Designation: Nonattainment 107(d)(1)(B) Primary	107(d)(1)(C) Secondary	107(d)(1)(D) Not B or C
Laurel Area	*		
East Helena Area	*		
Billings			*
Colstrip Area			*
Rest of State			*

5. Total Suspended Particulate

Designated Area	Designation: Nonattainment 107(d)(1)(B) Primary	107(d)(1)(C) Secondary	107(d)(1)(D) Not B or C
Decker			*
Hardin			*
Billings Downtown		*	
Billings Area			*(1)
Great Falls CBD		*	
Great Falls Area			*(2)
Butte Area		*	
Philipsburg			*(1)
East Helena		*	
Three Forks			*(1)(2)
Miles City			*

TABLE AP-C-I (Continued)

ATTAINMENT STATUS

Designated Area	Designation: Nonattainment 107(d)(1)(B) Primary	Nonattainment 107(d)(1)(C) Secondary	107(d)(1)(D) Not B or C
Ekalaka			*(2)
Fort Peck			*
Lame Deer			*
Scobey			*
Glendive			*
Colstrip	*		
Broadus			*(1)
Lindsay			*(1)
Poplar			*
Columbia Falls	*		
Kalispell			*(1)
Libby			*
Troy			*
Missoula Area	*	*	

(1) Violation of standard due to fugitive dust from non-industrial sources - unpaved roads, etc.
(2) Insufficient data from which to classify the area.

Revisions/Considerations of the Original Designation Proposal

Soon after the Department submitted its original proposal in 1978, new data indicated other areas were violating standards. In the years that followed, plans and considerations to the original proposal have developed. The following discusses some of the revisions and considerations of the original designation proposal.

1. Billings - TSP

Billings was designated as non-attainment for total suspended particulates. The TSP plan was approved on March 4, 1980 (45 FR 14036). The secondary standard for TSP is nearing attainment as a result of extensive street sweeping and flushing programs.

2. Billings - CO

Billings was also designated as nonattainment for carbon monoxide. The plan for attainment of the 8-hour CO standard predicted that a modification of the Exposition Drive-First Avenue North intersection would achieve the standards. A proposal to approve the plan appeared on July 23, 1984 (49 FR 29620). The intersection highway work was completed at the end of 1983 and the CO data to date (located near the intersection) indicate no exceedances of the CO standard.

3. Butte - TSP

Soon after the Department submitted its proposal, additional data from Butte indicated the area was violating primary standards for total suspended particulates. As a result, EPA immediately promulgated a nonattainment designation for Butte for violation of the primary standard.

The original SIP called for attaining the standard through enforcement of the airborne particulate rule. The Department of Health and Environmental Sciences and Department of Highways were to develop a set of emission factors for paved and unpaved roads and apply these factors to the appropriate streets in the Butte area. As it turned out, the development of these factors proved impossible. The Department turned its attention to developing a control plan in conjunction with the Anaconda Minerals Company (ARCO) and the city of Butte.

A plan which called for a permit from ARCO and street paving and sweeping by the City of Butte was developed and approved by the Board of Health. The plan was submitted to EPA in February 1983. EPA has recently questioned some of the modeling aspects of the plan, but has failed to make any formal response.

A request for redesignation to attainment has also been requested by the state (February, 1983). There has been no action from EPA on this request.

4. Colstrip - TSP

Colstrip was designated as nonattainment for total suspended particulates. The control strategy involved a permit (hence RACT) for the nearby coal mines. Such a permit has been evaluated and issued according to the plan.

On July 5, 1983, and again on July 23, 1984, EPA published a notice of proposed rulemaking (48 FR 30696 and 49 FR 29620, respectively) on the Colstrip area. The plan was approved on April 26, 1985 (50 FR 16475).

Montana, in cooperation with Montana Power Company, Western Energy Company, and Peabody Coal Company, prepared a redesignation request document. The request has been reviewed and was approved by EPA on April 26, 1985 (50 FR 16476).

5. Columbia Falls - TSP

Columbia Falls was designated as non-attainment for total suspended particulates based upon the Anders monitoring site. The control strategy for this area involved the rebuilding of Highway 40 and Nucleus Avenue through Columbia Falls. The paving project for Nucleus was completed in late fall, 1982. Highway 40 was finished in fall, 1984. Data to date indicate probable compliance with the primary standard. A request for redesignation will be considered in the near future.

6. East Helena - TSP

East Helena was designated as a non-attainment area for total suspended particulates based upon the Hastie monitoring site. No special control strategy was implemented since the emission inventory demonstrated over 50% of the particulate emissions were from near-by highway construction In addition, ASARCO agreed to reduce TSP emissions from slag piles by spraying the piles with water or other coating material. The data for 1981, 1982 and 1983 indicate compliance with the primary standards. A request for redesignation may be forthcoming.

7. East Helena - SO_2

East Helena was designated non-attainment for sulfur dioxide in 1977. The ASARCO smelter installed an acid plant with several modified stacks to reduce the sulfur dioxide emissions. Data for the past four years has indicated compliance with the ambient standards. A redesignation request has been made. Final approval is dependent upon the outcome of the final GEP rule.

8. Great Falls - TSP

The Great Falls area was designated nonattainment of the secondary standard for total suspended particulates. The city has instituted a sweeping/flushing strategy that is expected to show attainment for the TSP standard in the near future. Data for 1983 indicate compliance with the secondary standard while 1982 and 1984 indicate near compliance.

9. Great Falls - CO

A corridor along 10th Ave. South was designated as nonattainment for carbon monoxide in September, 1980. The Great Falls City-County Planning Agency was designated as the lead agency to develop a SIP. The plan was developed in conjuction with the Highway Department and Air Quality Bureau. The plan shows that an improvement in automobile emissions as a result of EPA-mandated emission standards and reductions at the Montana Refining Company (formerly Phillips Petroleum Company) will bring the area into compliance by the end of 1985 or 1986. In addition to the improvements in automobiles, the city has completed a number of projects such as improved traffic synchronization, widening of the Warden Street bridge, and a new mass transit system which should assure attainment.

A problem recently surfaced when it was discovered that Montana Refining Company had not followed through with their permit request which would have reduced CO emissions. The state is currently negotiating with Montana Refining for the necessary reductions.

10. Missoula - TSP

The city of Missoula has been designated as nonattainment for total suspended particulates. The city has incorporated a systematic program of street sweeping and flushing to show attaiment by 1982. The plan was approved by EPA in September 23, 1980 (45 FR 62984). Data to date indicates compliance with the annual standard, but an occasional excursion of the 24-hour standard.

11. Missoula - CO

Missoula was designated as nonattainment for carbon monoxide based upon a monitoring station near the intersection of Brooks, Russell, and South (Malfunction Junction). The plan calls for reconstruction of the intersection which is now in progress and is expected to be completed in 1985. The plan had been previously disapproved (due to conflicts with the Clean Air Act), but is now proposed for approval (July 23, 1984 - 49 FR 29620). It appears that wood smoke may be a significant contributor to the problem. If this fact is borne out, the plan will need to be modified to account for this source.

12. Laurel/Billings - SO_2

The Laurel area was designated as nonattainment for sulfur dioxide due to readings near the Cenex refinery. Modeling calculations showed potential violations within the Billings area as well. In 1977, a stipulation was signed between the various sulfur dioxide sources and the Department of Health and Environmental Sciences to further study the matter. The stipulation also required some modifications at these sources. An ambient sampling program, as required by the stipulation, was completed in October, 1982. The results of the monitoring indicate no violations of the national ambient air quality standards in Billings or Laurel. A draft modeling report has been completed. It appears the area complies with federal ambient air quality standards and thus a redesignation request may be forthcoming.

13. Anaconda - SO_2

The Anaconda area was designated nonattainment for sulfur dioxide. The area experienced frequent violations of the ambient air quality standards for sulfur dioxide as a results of the Anaconda Company (ARCO) copper smelter complex. In July, 1980, the smelter temporarily ceased operations as a results of a strike. In September of the same year, Anaconda announced it was permanently ceasing operations at the smelter. As a result of these conditions, the state requested the area be redesignated to attainment. The designation to attainment was made final on July 15, 1982 (47 FR 30762).

Impacts of Designation

Designation of an area as nonattainment triggers the requirement to develop a control plan to bring the area into compliance. The final compliance date for primary sulfur dioxide and total suspended particulate standards was December 31, 1982. For carbon monoxide and oxidants, the act provided for extensions up to December 31, 1987.

The Department developed control plans for each of the nonattainment areas and they are contained in the State Implementation Plan. Many of the plans were modified as more accurate air quality and emissions data became available. Some of the plans such as the East Helena sulfur dioxide plan were carried out with good success. Others were unnecessary due to plant shutdowns as was the case in Anaconda. The plans for carbon monoxide have been followed and are showing progress toward compliance. Although plans were developed for particulates, progress has been slow due to expensive and untried control strategies and the need for frequent plan modifications. Nevertheless it appears that compliance with the primary total suspended particulate standard has been achieved in Colstrip, Butte, and Columbia Falls.

The Department is continuing to work on the particulate problem; however, the newly proposed PM_{10} standard may change the attainment/nonattainment status of some areas as well as the appropriate control strategies. Since the PM_{10} standard considers only particles less than 10 microns in diameter vs. 40 microns for total suspended particulate, control strategies will need to be directed at sources of fine particulate.

APPENDIX D

Precision & Accuracy

APPENDIX D

Precision/Accuracy

Precision applies to the repeatability of the instrument and is obtained by the use of collocated samplers (TSP) or the introduction of a known gas concentration on a weekly or oftener basis. Ninety-five percent confidence (probability limits) are then calculated from the average % difference and the standard deviation % difference. PL = $\overline{X} \pm 1.96$ SD/ $\sqrt{2}$ (TSP) or PL = $\overline{X} \pm 1.96$ SD (continuous).

Accuracy implies just that. How accurate is the instrument? It is obtained through independent audits by the Quality Assurance Section of AQB. Probability limits are calculated as with precision data. PL = $\overline{X} \pm 1.96$ SD/ $\sqrt{2}$ (TSP); PL = $\overline{X} \pm 1.96$ SD.

The EPA requires quarterly reports of the P&A data, as well as an annual SLAMS (State and Local Air Monitoring Sites) report which includes the P&A for SLAMS sites throughout the state.

Tables DI (Precision) and DII (Accuracy) summarize the P&A data by reporting agency and pollutant, quarterly and annually. Table DIII lists the audits performed in 1984 by site, giving dates and % difference.

Table DI

Precision TSP

Air Quality Bureau #001

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	2.01	- 4.53	- 1.56	- 3.83	- 2.17
Std. Deviation (SD) % Diff.	18.24	11.24	29.15	14.60	19.39
Upper Prob. Limit (UPL)	+27.28	+11.05	+38.83	+16.40	+24.71
Lower Prob. Limit (LPL)	-23.27	-20.10	-41.99	-24.07	-29.04
No. of Data Pairs	44	51	50	56	201
No. Readings <20 ug	5	4	2	0	11
No. of Sites	3	3	3	3	3

Yellowstone County #002

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	- 0.14	2.43	- 0.32	2.04	1.07
SD % Diff.	5.65	3.24	4.06	2.71	4.18
UPL	+ 7.70	+ 6.91	+ 5.94	+ 5.79	+ 6.87
LPL	- 7.97	- 2.06	- 5.31	- 1.72	- 4.72
No. of Data Pairs	16	12	15	15	58
No. Readings <20 ug	0	0	0	0	0
No. of Sites	1	1	1	1	1

Cascade County #003

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	- 3.73	- 2.67	2.22	- 4.79	- 2.29
SD % Diff	9.97	5.97	8.03	7.89	8.49
UPL	+10.09	+ 5.59	+13.34	+ 6.14	+ 9.48
LPL	-17.55	-10.94	- 8.91	-15.72	-14.06
No. of Data Pairs	16	7	15	15	53
No. Readings <20 ug	2	1	0	0	3
No. of Sites	1	1	1	1	1

Missoula County #004

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	- 4.72	11.92	2.02	1.13	2.87
SD % Diff.	7.12	20.62	7.02	6.76	13.37
UPL	+ 5.15	+40.50	+11.75	+10.50	+21.39
LPL	-14.59	-16.66	- 7.71	- 8.24	-15.66
No. of Data Pairs	24	28	27	28	107
No. Readings <20 ug	0	7	2	0	9
No. of Sites	1	1	1	1	1

Precision SO2

Air Quality Bureau #001 (SLAMS/NAMS)

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	8.85	13.37	- 3.06	0.76	5.12
SD % Diff.	11.15	14.67	6.04	7.77	12.26
UPL	+30.69	+42.11	+ 8.78	+15.99	+29.16
LPL	-13.00	-15.38	-14.91	-14.48	-18.91
No. Checks	23	22	23	18	86
No. of Sites	2	2	2	2	2

Air Quality Bureau #001 (All Sites)

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	8.92	14.81	- 2.77	0.08	3.21
SD % Diff.	10.59	14.39	7.13	6.45	11.52
UPL	+29.69	+43.02	+11.22	+12.73	+25.79
LPL	-11.85	-13.39	-16.75	-12.57	-19.38
No. Checks	34	34	74	47	189
No. of Sites	3	3	5	5	5

Precision CO

Yellowstone County #002

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	5.13	0.02	- 6.05	- 1.86	- 0.98
SD % Diff.	4.37	11.65	3.90	2.74	6.71
UPL	+13.68	+16.17	+ 1.60	+ 3.51	+12.18
LPL	- 3.43	-16.13	-13.70	- 7.23	-14.14
No. Checks	6	7	6	15	34
No. of Sites	1	1	1	1	1

Table DI, Cont.

Cascade County #003

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	- 4.74	- 3.62	- 2.09	1.14	- 2.29
SD % Diff.	4.46	2.98	3.68	2.16	3.99
UPL	+ 4.01	+ 0.51	+ 5.11	+ 5.36	+ 5.53
LPL	-13.49	- 7.74	- 9.30	- 3.09	-10.11
No. Checks	11	10	13	11	45
No. of Sites	1	1	1	1	1

Missoula County #004

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	- 2.85	- 1.08	1.21	4.40	0.32
SD % Diff.	6.18	3.04	1.69	3.67	4.65
UPL	+ 9.26	+ 3.13	+ 4.52	+11.59	+ 9.45
LPL	-14.96	- 5.29	- 2.10	- 2.79	- 8.80
No. Checks	12	13	13	11	49
No. of Sites	1	1	1	1	1

Precision Lead

Air Quality Bureau #001

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	4.17	- 5.52	- 9.91	8.96	- 5.47
SD % Diff.	34.39	11.40	22.20	19.00	23.13
UPL	+51.84	+16.83	+20.86	+17.38	+26.58
LPL	-43.49	-27.87	-40.67	-35.30	-37.53
No. of Data Pairs	23	25	27	29	104
No. Readings <0.15 ug	0	0	1	0	1
No. of Sites	1	1	1	1	1

TABLE DII

Accuracy TSP

Air Quality Bureau #001 (SLAMS/NAMS)

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	0.24	0.27	- 0.30	- 1.55	- 0.24
SD % Diff.	2.70	2.26	1.71	2.24	2.35
UPL	+ 3.98	+ 3.41	+ 2.07	+ 1.55	+ 3.01
LPL	- 3.50	- 2.87	- 2.67	- 4.66	- 3.50
No. of Audits	42	18	36	21	117

Air Quality Bureau #001 (All Sites)

Avg. % Diff.	0.28	0.47	- 0.05	- 1.11	- 0.07
SD % Diff.	2.52	2.18	1.84	2.56	2.34
UPL	+ 3.77	+ 3.49	+ 2.50	+ 2.43	+ 3.18
LPL	- 3.21	- 2.55	- 2.60	- 4.66	- 3.31
No. of Audits	53	21	43	29	146

Yellowstone County #002

Avg. % Diff.	- 1.90	- 0.37	- 0.25	- 2.55	- 1.06
SD % Diff.	0.14	1.36	0.78	- 1.63	1.49
UPL	- 1.70	+ 1.52	+ 1.33	- 0.30	+ 1.00
LPL	- 2.10	- 2.25	- 0.83	- 4.80	- 3.12
No. of Audits	2	2	2	2	9

Cascade County #003

Avg. % Diff.	2.67	2.87	0.93	1.28	1.81
SD % Diff.	3.37	4.22	0.45	2.87	2.68
UPL	+ 7.33	+ 8.71	+ 1.55	+ 5.25	+ 5.53
LPL	- 2.00	- 2.98	- 0.30	- 2.70	- 1.90
No. of Audits	3	3	4	4	14

Missoula County #004

Avg. % Diff.	0.93	1.58	- 3.25	0.37	0.24
SD % Diff.	2.29	2.57	2.95	5.11	3.19
UPL	+ 4.10	+ 5.14	+ 0.83	+ 7.44	+ 4.67
LPL	- 2.24	- 1.98	- 7.33	- 6.71	- 4.19
No. of Audits	10	5	7	3	22

TABLE DII, Cont.

Industry*

	Quarter 1st	2nd	3rd	4th	Annual
Avg. % Diff.	1.26	0.95	0.58	0.23	0.81
SD % Diff.	3.40	1.39	2.00	3.40	2.62
UPL	+ 5.97	+ 2.88	+ 3.36	+ 4.96	+ 4.43
LPL	- 3.44	- 0.97	- 2.19	- 4.47	- 2.82
No. of Audits	16	11	17	9	53

Indian Reservations*

Avg. % Diff.	---	1.10	- 1.07	---	0.01
SD % Diff.	---	3.66	2.48	---	3.16
UPL	---	+ 6.17	+ 2.37	---	+ 1.73
LPL	---	- 3.97	- 4.51	---	- 1.71
No. of Audits	---	5	5	---	10

*Data by site available by request.

Accuracy SO2

Air Quality Bureau #001 (SLAMS/NAMS)

		Level 1	Level 2	Level 3	Level 4	Full Scale
1st Qtr.	Avg. % Diff.	- 4.00	5.15	4.60	1.30	1.85
	SD % Diff.	7.92	6.43	4.53	0.42	0.07
	UPL	+10.62	+17.76	+13.47	+ 2.13	+ 1.99
	LPL	-20.42	- 7.46	- 4.27	- 0.47	- 1.71
	No. of Audits	2	2	2	2	2
2nd Qtr.	Avg. % Diff.	- 5.78	- 4.95	- 5.30	- 5.73	- 5.68
	SD % Diff.	6.08	3.32	2.91	3.63	3.48
	UPL	+ 6.13	+ 1.55	+ 0.40	+ 1.38	+ 1.14
	LPL	-17.68	-11.45	-11.00	-12.83	-12.50
	No. of Audits	4	4	4	4	4
3rd Qtr.	Avg. % Diff.	- 0.63	- 4.03	- 6.73	- 9.18	- 8.90
	SD % Diff.	7.01	5.01	6.22	5.08	4.94
	UPL	+13.12	+ 5.80	+ 5.47	+ 0.78	+ 0.78
	LPL	-14.37	-13.85	-18.92	-19.13	-18.58
	No. of Audits	4	4	4	4	4
4th Qtr.	Avg. % Diff.	6.85	1.05	- 2.60	- 3.05	- 3.30
	SD % Diff.	13.93	21.71	11.46	6.29	6.51
	UPL	+34.15	+43.60	+19.85	+ 9.28	+ 9.45
	LPL	-20.45	-41.50	-25.05	-15.38	-16.05
	No. of Audits	2	2	2	2	2
Annual	Avg. % Diff.	- 1.81	- 1.96	- 3.68	- 5.26	- 5.10
	SD % Diff.	8.27	8.49	6.61	5.35	5.34
	UPL	+14.40	+14.68	+ 9.27	+ 5.22	+ 5.37
	LPL	-18.02	-18.60	-16.62	-15.74	-15.57
	No. of Audits	12	12	12	12	12

Air Quality Bureau #001 (All Sites)

		Level 1	Level 2	Level 3	Level 4	Full Scale
1st Qtr.	Avg. % Diff.	- 6.27	4.37	3.87	0.77	1.33
	SD % Diff.	6.08	4.75	3.44	0.97	0.90
	UPL	+ 5.65	+13.67	+10.61	+ 2.67	+ 3.09
	LPL	-18.18	- 4.94	- 2.88	- 1.14	- 0.42
	No. of Audits	3	3	3	3	3
2nd Qtr.	Avg. % Diff.	- 7.32	- 4.07	- 3.35	- 3.83	- 3.65
	SD % Diff.	8.43	4.93	4.78	4.98	4.98
	UPL	+ 9.21	+ 5.61	+ 6.02	+ 5.92	+ 6.12
	LPL	-23.85	-13.74	-12.72	-13.59	-13.42
	No. of Audits	6	6	6	6	6
3rd Qtr.	Avg. % Diff.	- 0.85	- 3.64	- 5.53	- 7.23	- 7.15
	SD % Diff.	6.59	5.58	6.06	6.22	5.23
	UPL	+12.07	+ 7.30	+ 6.36	+ 4.96	+ 3.10
	LPL	-13.77	-14.58	-17.41	-19.43	-17.40
	No. of Audits	8	8	8	6	8
4th Qtr.	Avg. % Diff.	12.60	6.77	1.13	- 0.43	- 0.63
	SD % Diff.	14.01	18.27	10.36	6.35	6.52
	UPL	+40.05	+42.57	+21.45	+12.02	+12.14
	LPL	-14.85	-29.04	-19.18	-12.88	-13.41
	No. of Audits	3	3	3	3	3
Annual	Avg. % Diff.	- 1.59	- 1.01	1.96	- 3.27	- 3.85
	SD % Diff.	10.25	8.68	6.86	5.57	5.62
	UPL	+18.51	+16.01	+15.40	+ 7.66	+ 7.17
	LPL	-21.68	-18.02	-11.49	-14.20	-14.87
	No. of Audits	20	20	20	18	20

Accuracy CO

Air Quality Bureau #001

		Level 1	Level 2	Level 3	Level 4	Full Scale
1st Qtr.	Avg. % Diff.	- 3.00	- 1.00	- 1.25	---	- 0.50
	SD % Diff.	16.26	0.14	2.33	---	3.39
	UPL	+28.88	- 0.72	+ 3.32	---	+ 6.15
	LPL	-34.88	- 1.28	- 5.82	---	- 7.15
	No. of Audits	2	2	2	0	2

Table DII, Cont.

		Level 1	Level 2	Level 3	Level 4	Full Scale
Annual	Avg. % Diff.	- 3.00	- 1.00	- 1.25	---	- 0.50
	SD % Diff.	16.26	0.14	2.33	---	3.39
	UPL	+28.88	- 0.72	+ 3.32	---	+ 6.15
	LPL	-34.88	- 1.28	- 5.82	---	- 7.15
	No. of Audits	2	2	2	0	2

NOTE: Site only run during winter months for a special study. Shut down in April.

Yellowstone County #002

		Level 1	Level 2	Level 3	Level 4	Full Scale
1st Qtr.	Avg. % Diff.	---	---	---	---	---
	SD % Diff.	---	---	---	---	---
	UPL	---	---	---	---	---
	LPL	---	---	---	---	---
	No. of Audits	0	0	0	0	0
2nd Qtr.	Avg. % Diff.	7.60	5.80	- 0.75	---	- 0.36
	SD % Diff.	5.66	4.10	1.06	---	0.49
	UPL	+18.69	+13.84	+ 1.33	---	+ 0.60
	LPL	- 3.49	- 2.24	- 2.83	---	- 1.31
	No. of Audits	2	2	2	0	2
3rd Qtr.	Avg. % Diff.	9.6	- 0.5	- 5.5	---	- 4.9
	SD % Diff.	---	---	---	---	---
	UPL	---	---	---	---	---
	LPL	---	---	---	---	---
	No. of Audits	1	1	1	0	1
4th Qtr.	Avg. % Diff.	- 8.05	-11.15	- 8.20	---	- 8.50
	SD % Diff.	24.96	15.06	3.82	---	5.09
	UPL	+40.87	+18.37	- 0.72	---	+ 1.48
	LPL	-56.97	-40.67	-15.68	---	-18.48
	No. of Audits	1	1	1	0	1
Annual	Avg. % Diff.	- 3.03	- 2.68	- 4.48	---	- 4.43
	SD % Diff.	16.97	13.30	4.87	---	5.55
	UPL	+30.22	+23.40	+ 5.07	---	+ 6.46
	LPL	-36.28	-28.75	-14.02	---	-15.31
	No. of Audits	4	4	4	0	4

Table DII, Cont.

Cascade County #003

		Level 1	Level 2	Level 3	Level 4	Full Scale
1st Qtr.	Avg. % Diff.	- 1.20	- 2.20	- 0.70	---	- 1.15
	SD % Diff.	7.21	10.75	12.30	---	12.23
	UPL	+12.94	+18.87	+23.42	---	+22.83
	LPL	-15.34	-23.27	-24.82	---	-25.13
	No. of Audits	2	2	2	0	2
2nd Qtr.	Avg. % Diff.	2.00	5.50	7.60	---	7.50
	SD % Diff.	---	---	---	---	---
	UPL	---	---	---	---	---
	LPL	---	---	---	---	---
	No. of Audits	1	1	1	0	1
3rd Qtr.	Avg. % Diff.	2.4	5.6	5.6	---	5.2
	SD % Diff.	---	---	---	---	---
	UPL	---	---	---	---	---
	LPL	---	---	---	---	---
	No. of Audits	1	1	1	0	1
4th Qtr.	Avg. % Diff.	- 4.65	- 0.90	- 1.05	---	- 0.95
	SD % Diff.	9.97	9.19	9.40	---	8.70
	UPL	+14.89	+17.12	+17.38	---	+16.10
	LPL	-24.19	-18.92	-19.48	---	-18.00
	No. of Audits	1	1	1	0	1
Annual	Avg. % Diff.	- 1.94	- 0.14	0.82	---	0.66
	SD % Diff.	6.76	7.77	8.62	---	8.42
	UPL	+11.31	+15.09	+17.72	---	+17.17
	LPL	-15.19	-15.37	-16.08	---	-15.85
	No. of Audits	5	5	5	0	5

Table DII, Cont.

Missoula County #004

		Level 1	Level 2	Level 3	Level 4	Full Scale
1st Qtr.	Avg. % Diff.	3.0	3.1	3.5	---	3.5
	SD % Diff.	---	---	---	---	---
	UPL	---	---	---	---	---
	LPL	---	---	---	---	---
	No. of Audits	1	1	1	0	1
2nd Qtr.	Avg. % Diff.	- 1.55	- 0.85	0.45	---	0.65
	SD % Diff.	6.43	5.59	4.31	---	4.03
	UPL	+11.06	+10.10	+ 8.90	---	+ 8.55
	LPL	-14.16	-11.80	- 8.00	---	- 7.25
	No. of Audits	1	1	1	0	1
3rd Qtr.	Avg. % Diff.	3.70	0.17	- 3.30	---	- 2.00
	SD % Diff.	---	---	---	---	---
	UPL	---	---	---	---	---
	LPL	---	---	---	---	---
	No. of Audits	1	1	1	0	1
4th Qtr.	Avg. % Diff.	- 4.30	- 3.62	- 2.10	---	- 2.05
	SD % Diff.	11.31	5.35	0.85	---	0.07
	UPL	+17.87	+ 6.88	- 1.04	---	- 1.91
	LPL	-26.47	-14.11	- 4.36	---	- 2.19
	No. of Audits	1	1	1	0	1
Annual	Avg. % Diff.	- 2.93	- 2.33	- 1.13	---	- 0.70
	SD % Diff.	7.68	4.74	3.12	---	2.80
	UPL	+12.13	+ 7.06	+ 4.99	---	+ 4.79
	LPL	-17.98	-11.53	- 7.24	---	- 6.19
	No. of Audits	4	4	4	0	4

Table DII, Cont.

Accuracy Lead

Air Quality Bureau #001 (SLAMS/NAMS)

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	0.28	0.44	0.81	- 2.19	- 0.03
SD % Diff.	2.86	2.59	2.03	0.90	2.57
UPL	+ 4.24	+ 4.02	+ 3.72	- 0.94	+ 3.53
LPL	- 3.69	- 3.14	- 2.09	- 3.43	- 3.60
No. of Audits	18	12	7	8	45

Air Quality Bureau #001 (All Sites)

	Quarter				
	1st	2nd	3rd	4th	Annual
Avg. % Diff.	- 0.16	0.44	0.81	- 2.19	- 0.21
SD % Diff.	2.95	2.59	2.03	0.90	2.62
UPL	+ 3.92	+ 4.02	+ 3.72	- 0.94	+ 3.43
LPL	- 4.25	- 3.14	- 2.09	- 3.43	- 3.84
No. of Audits	21	12	7	8	48

Table DIII

Site #	Site Name	Date	Results
0020 007	Anaconda Lincoln School	1/24	- 0.6
		5/2	+ 0.9
		11/21	+ 2.8
0020 004	Anaconda Hiway Junction	11/21	+ 4.2
0080 008	Billings City Hall Rptg	5/8	- 0.2
		12/5	- 3.7
	Billings City Hall Collocated	5/8	- 1.8
		12/5	- 1.4
0080 009	Billings Grand Ave. School	3/29	- 2.0
		8/27	- 0.3
0080 061	Billings Metra Fairgrounds CO	3/29	-23.9**
		5/10	- 0.01
		8/7	- 4.9
		12/5	-12.1
0080 062	Billings Taft School E Rptg	1/9	- 1.8
		3/28	+ 2.2
		(3/29)	+ 3.9
		8/10	- 1.1
		12/5	- 2.4
0080 062	Billings Taft School W Colloc.	1/9	- 0.04
		3/28	+ 0.4
		(3/29)	+ 0.2
		8/10	- 1.2
		12/5	- 7.5*
0080 062	Billings Taft School SO2	1/11	+ 0.1
0080 064	Billings No. Johnson Lane SO2	1/10	- 7.6
		3/28	+ 1.8
		5/8	- 5.9
		8/7	- 8.9
		8/27	+ 2.8
		12/4	+ 4.7
0080 065	Billings Lockwood Park SO2	1/10	- 7.6
		3/28	+ 1.8
		5/8	- 5.9
		8/6	-15.6**
		8/27	- 3.9
		12/4	+ 1.3
0080 065	Billings Lockwood Park TSP	1/10	+ 0.9
		3/28	- 1.8
		5/8	- 2.3
		8/6	+ 0.6
		12/4	+26.6*
		(Sampling head loose.)	
0080 066	Billings Coburn Road SO2	1/10	- 2.4
		3/28	+ 1.9
		5/9	-10.4
		8/10	- 7.1
		8/28	- 9.0
		12/5	- 7.9

Table DIII, Cont.

Site	Site Name	Date	Results
0080 067	Billings Sandstone Sch. TSP	3/29	- 1.8
		8/27	+ 0.8
0120 002	Bozeman E. Main City Bldg	1/19	motor failure
		3/2	- 0.8
		6/15	+ 0.8
		7/27	- 1.8
		(7/27)	+ 0.7
		11/23	- 2.8
0120 005	Bozeman Whittier School	1/19	+ 2.3
		6/15	+ 1.6
		7/27	- 3.5
		(7/27)	- 0.8
		11/23	- 1.7
0160 005	Butte Greeley Sch. #1 Rptg	1/24	+ 7.2*
		7/6	- 4.1
		11/21	+ 4.3
0160 005	Butte Greeley Sch. #2 Colloc	1/24	+ 0.1
		7/6	- 1.4
		11/21	- 1.8
0270 005	Columbia Falls Anders	7/9	- 0.9
		(7/9)	+ 0.7
0340 001	Scobey Border Site TSP	8/7	+ 0.9
		8/29	+ 5.7
0340 001	Scobey Border Site SO2	8/29	- 6.5
0340 002	Scobey Richardson TSP	8/7	+ 7.8*
		8/30	+ 0.6
0340 004	Scobey Hanrahan TSP	8/7	- 1.6
		8/30	+ 0.2
0340 004	Scobey Hanrahan SO2	8/29	- 9.0
0380 001	Deer Lodge	12/18	calibrator leak
0420 001	Beaverhead Co. - Dillon	11/21	+ 3.9
0440 001	Plevna - Bohle Ranch	8/28	- 3.5
0570 007	Glacier NP W. Glacier	7/10	- 0.6
		(7/10)	- 0.5
		11/13	+ 0.7
0570 010	Glacier NP St. Mary's	7/9	+ 0.5
		(7/9)	+ 1.9
		11/13	+ 1.9
0600 002	Glendive GMAC	8/28	+ 1.1
0660 009	Great Falls FS#1	2/23	+ 1.3
		8/2	+ 1.3
		10/12	- 1.8
0660 017	Gt. Falls Downtown W Rptg	1/26	+ 0.4
		6/7	+ 7.3*
		8/2	+ 0.4
		10/12	+ 1.3

Table DIII, Cont.

Site	Site Name	Date	Results
0660 017	Gt. Falls Downtown E Colloc	1/26	- 1.2
		6/7	- 1.1
		8/2	+ 0.7
		10/12	+ 5.1
0660 019	Gt. Falls Black Eagle PO	6/7	+ 2.4
		8/2	+ 1.3
		10/12	+ 0.5
0660 023	Gt. Falls Pardis CO	2/23	- 9.8
		3/8	+ 7.5 (EPA)
		4/27	+ 7.5
		8/2	+ 5.2
		10/12	- 7.1
0720 001	Helena Cogswell Bldg	1/5	+ 4.2
		2/16	- 0.6
		9/20	- 0.9
0720 013	Helena Capital Courts	2/16	+ 1.7
		9/20	- 1.0
0720 016	Helena Cooney Home	2/16	- 2.2
		6/12	+ 0.3
0760 903	Jefferson Co. MT City School	1/4	+ 0.01
		(1/4)	+ 1.2
		9/20	- 2.6
0800 015	Kalispell Universal Athletics	2/2	+ 1.1
		7/9	- 1.2
		(7/9)	+ 2.6
		11/14	- 2.4
0800 017	Kalispell Courthouse E	2/2	+ 1.5
		7/9	- 0.8
		(7/9)	- 0.1
		11/14	- 1.7
0840 001	Laurel Jr. High	5/8	+ 0.9
0860 002	L&C Co. Hastie	1/4	+ 2.6
		2/2	- 1.6
		2/16	+ 0.5
		3/12	- 2.1
		5/7	- 1.3
		6/12	+ 0.5
		8/21	+ 1.0
		11/19	- 2.8
0860 014	L&C Co. Firehall	1/4	- 0.3
		2/8	- 3.3
		3/12	- 4.8
		5/7	+ 3.1
		5/29	+ 0.8
		8/20	+ 0.5
		11/19	- 1.2

Table DIII, Cont.

Site	Site Name	Date	Results
0860 716	L&C Co. South	1/23	- 0.03
		2/8	- 4.1
		(2/8)	- 1.1
		3/12	+ 2.0
		5/1	+ 2.2
		5/29	- 0.2
		8/13	+ 1.2
		11/19	- 2.2
0860 719	L&C Co. Hadfield W (Rptg)	2/2	+ 1.9
		2/16	+ 4.1
		3/12	+ 1.2
		5/7	- 0.5
		6/12	- 1.9
		8/21	- 2.8
		11/19	- 1.8
		12/27	- 3.6
0860 719	L&C Co. Hadfield E Colloc	2/2	- 0.7
		2/17	+ 5.5
		3/14	+ 5.2
		5/7	+ 5.7
		7/12	+ 2.5
		8/21	+ 0.1
		11/19	- 3.4
		12/27	- 2.1
0860 724	L&C Co. Dartman Field	1/23	- 2.6
		2/2	- 0.3
		2/9	- 3.9
		3/12	- 1.6
		5/1	- 3.3
		5/29	- 2.3
		7/30	+ 1.4
		11/19	- 2.9
0900 010	Libby Brown	2/1	+ 1.9
		(2/1)	- 2.8
		7/10	+ 0.02
		(7/10)	+ 0.1
		11/14	- 0.9
0900 014	Libby Lincoln Co. Courthouse	2/1	+ 0.5
		3/13	- 1.7
		7/10	- 0.7
		7/11	- 0.9
		11/14	- 0.4
	Libby Lincoln Co. Crths. Colloc.	7/10	+ 0.8
		11/14	- 0.7
	Libby Lincoln Co. Crths. Quartz	2/1	- 0.1
		3/13	- 0.7
	Libby Lincoln Co. Crths. Teflon	2/1	+ 4.8
		4/17	+ 2.7
		7/11	- 0.1
		11/14	- 3.8

Table DIII, Cont.

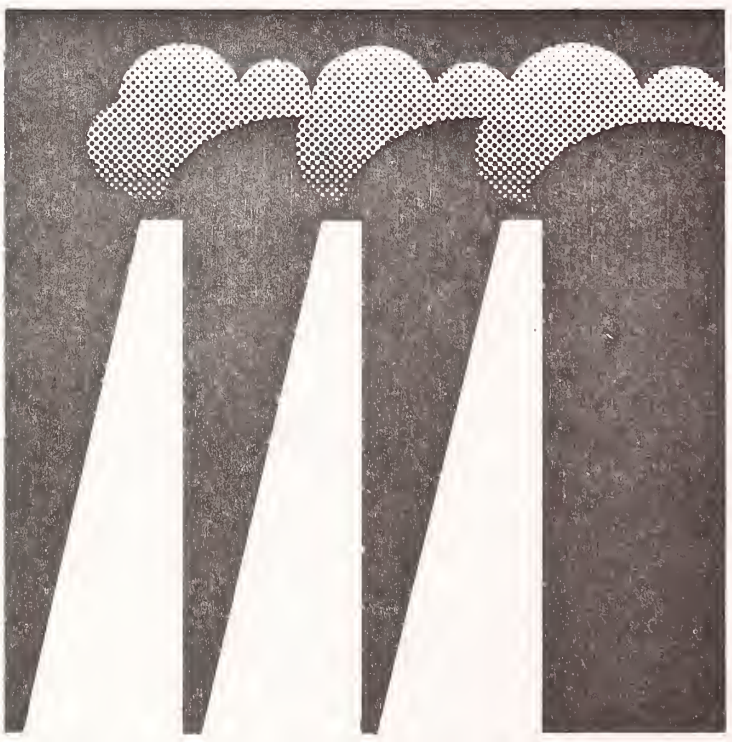
Site	Site Name	Date	Results
0900 016	Libby Lincoln County CO	2/1	+ 1.9
		3/10	- 2.9 (EPA)
0940 005	Eureka	7/9	- 0.4
		(7/9)	+ 1.8
		11/14	- 1.5
1100 001	Msla Courthouse Roof Rpt R	1/30	+23.3*
		7/12	- 1.1
1100 001	Msla Courthouse Roof Rpt L	1/30	+ 0.4
		7/12	- 3.3
1100 015	Msla HW#1 Rptg	3/20	+ 5.6
1100 015	Msla HW#1 Colloc	3/20	- 1.9
1100 016	Msla HW#2	3/20	+ 1.4
1100 020	Msla Rose Park Rpt R	3/20	- 0.5
		5/22	- 0.3
1100 020	Msla Rose Park Rpt L	3/20	+ 0.2
		5/22	+ 5.1
1100 020	Msla Rose Park Inhalable	3/20	+ 3.4
	40 cfm % diff. =		+ 2.6
1100 024	Msla Boyd Park Rpt R	3/21	+ 2.3
		5/22	+ 2.3
		11/28	+ 6.2
	Msla Boyd Park Rpt L	3/21	+ 1.5
		5/22	- 1.5
		11/28	- 3.3
	Msla Boyd Park Colloc	3/21	- 1.0
		5/22	+ 2.3
		11/28	- 1.8
	Msla Boyd Park Inhalable	3/21	+ 0.2
	40 cfm % diff. =		+ 2.9
1100 024	Msla Boyd Park CO	3/9	+ 3.5 (EPA)
		3/21	-14.4
		4/2	-16.8**
		5/23	- 2.2
		7/12	- 2.0
		11/28	- 2.0
1100 029	Missoula Meadow Hills	1/30	+ 0.2
		7/12	- 7.4*
1100 030	Missoula Tower/Spurgin	1/30	+ 1.2
		7/12	- 1.2
1200 001	Malta	8/31	+ 0.3
1260 024	Powell Co. Ovando	1/30	- 1.7
		7/12	+ 0.1
		(7/12)	- 0.4
1300 001	Hamilton Ravalli Co. Crths	3/20	- 0.5
		5/23	- 1.8
1320 010	Sidney	8/29	- 2.2

Table DIII, Cont.

Site	Site Name	Date	Results
1400 003	Sanders Co. Thomp. Falls Crths	1/31	- 1.3
		(1/31)	- 0.4
		7/11	+ 0.7
		(7/11)	+ 2.3
		11/15	- 3.4

Parentheses ( ) designate 2nd audit after recalibration

*Exceeded ± 7% State and EPA limits; recalibrated.
**Exceeded ±15% State and EPA limits; recalibrated.



APPENDIX E

List of Air Quality Publications

APPENDIX E

LIST OF AIR QUALITY PUBLICATIONS

State of Montana Air Quality Rules (July, 1984)

Clean Air Act of Montana (November, 1984)

1981 Network Review (November, 1981)

1982 Network Review (April, 1982)

1983 Network Review (September, 1983)

1984 Network Review (December, 1984)

Coefield, J. et al. Flathead River Basin Environmental Impact Study - Interim Annual Report for July 1979 through September 1980 (June, 1980).

Coefield, J. et al. Flathead River Basin Environmental Impact Study - Interim Annual Report for September 1980 to December 1981 (May, 1983).

Coefield, J.; Raisch, R. Flathead River Basin Environmental Impact Study - Air Resource Final Report (November, 1983).

Erickson, R.; Tomlinson, W.; Steffel, R.; Baxter, T. Survey of Residential Wood Use in Helena, Bozeman, Great Falls, and Kalispell, Montana (June, 1981).

Houck, J. et al. East Helena Source Apportionment Study (Sept. 1982).

McAllister, D.; Ruby, M.; Vichorek, D.; Crowley, F. Final Environmental Impact Study, Montana Ambient Air Quality Standards Study (February, 1980).

Olsen, J.; Schneider, J. Montana Air Quality Data and Information Summary for 1982 (September, 1983).

Raisch, R.; Sternberg, S.; Schneider, J. Montana Air Quality Data and Information Summary for 1981 (September, 1982).

Robbins, H., et al. Montana Quality Assurance Manual (December, 1980).

Sternberg, S. Montana Air Quality Data and Information Summary for 1979-1980 (August, 1981).

Sternberg, S. Montana Air Quality Data and Information Summary for 1983 (January, 1985).

Sternberg, S. Billings SO_2 Study, Data Analysis, Model Validation, and Source Determination (April, 1984)

APPENDIX E

LIST OF MAPS TECHNICAL REPORTS

Health Effects

1. Johnson, K; Schwaller, R; Wing, B. et al. Pulmonary Function Testing of Patients with Chronic Obstructive Pulmonary Disease (September 1979).

2. Johnson, K.; Gideon, R.; Loftsgaarden, D.; Wing, B. et al. Pulmonary Function Testing of Elementary School Children (October 1979).

3. Johnson, K.; Gideon, R.; Loftsgaarden, D.; Medvec, S.; Simms, M. et al. Relationship Between Human Health and Inhalable Particulates (October 1980).

4. Warren, G.; Rogers, S.; and Medvec, S. Mutagen Screening in an Isolated High Lung Cancer Mortality Area of Montana (June 1979).

Air Quality

1. Gelhaus, J., Air Quality Data Summaries for Anaconda-Butte, Billings, Missoula, and Columbia Falls/Hardin/East Helena/Colstrip (February 1981).

2. Robbins, H.; Driscoll, P.; Myren, B. et al. Air Monitoring Instrumentation (October 1979).

3. Rockwell Int. et al. Final Report for Laurel-Billings SO_2 Study, 1982.

Meteorology/Modeling

1. Gelhaus, J. et al. Meteorological Summary - First Year (July 1979).

2. Gelhaus, J. and Harner, S. Deer Lodge Valley Dispersion Study (July 1979).

3. Gelhaus, J. Meteorological Summary - Billings (February 1981).

4. Gelhaus, J., Machler, M., and Stewart, T. Montana Air Resources Modeling System (August 1979).

5. Middlemist, T.; Robbins, H; and Zimmerman, L. Missoula Valley Dispersion Study (September 1980).

6. Nelson, B.; Machler, M; and Robbins, H. Deer Lodge Valley Dispersion Study (October, 1980)

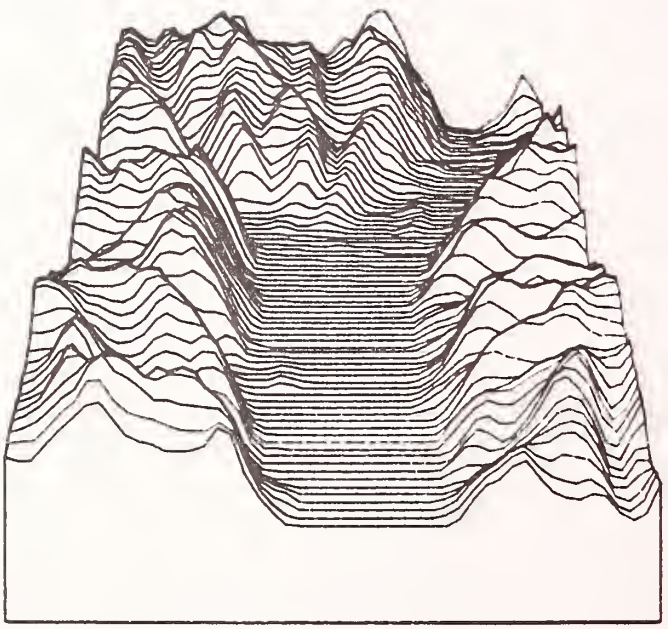
Emission Inventory

1. Bohn, R.; Cowherd, C.; Keller, R; and Raisch, R. Update and Improvement of the Emission Inventory for MAPS Study Areas (November 1979).

2. Raisch, R.; Williams, G.; Bohn, R.; and Cowherd, C. A Study of the Feasibility of Performing an Inventory of Historical Emissions at Butte and Anaconda, Montana (November 1979).

Systems Design

1. Lynn, D. et al. Computer Information System Development (November 1979).



APPENDIX F

Point Source Emission Estimates

APPENDIX F

POINT SOURCE EMISSION ESTIMATES

The following two tables list emission estimates from various industrial sources in the state. Table AP-F-I lists sulfur dioxide emissions; Table AP-F-II lists particulates.

Table AP-F-I

POINT SOURCE SULFUR DIOXIDE EMISSION ESTIMATES

Source	SO_2 Tons/Yr	County	City
Exxon Co., USA	16748	Yellowstone	Billings
Montana Power Co. (Corette)	5367	Yellowstone	Billings
Farmers' Union CENEX	8255	Yellowstone	Laurel
Continental Oil Co. (CONOCO)	3872	Yellowstone	Billings
Montana Sulfur	2130	Yellowstone	Billings
Great Western Sugar	879	Yellowstone	Billings
Westmoreland Resources	* 33	Big Horn	Hardin
East Decker Coal	* 39	Big Horn	Decker
Spring Creek Coal	* 8	Big Horn	Decker
West Decker Coal	* 20	Big Horn	Decker
Simmons Refinery	909	Cascade	Great Falls
WESTCO	1157	Glacier	Cut Bank
Union Oil of California	136	Glacier	Cut Bank
ASARCO	28749	Lewis & Clark	East Helena
Ideal Basic Industries	472	Gallatin	Trident
Kaiser Cement	374	Jefferson	Montana City
Montana Power Colstrip 1&2	4424	Rosebud	Colstrip
Oil and gas flaring	6000	Williston Basin**	
Montana Dakota Utilities	3659	Richland	Sidney
Shell Oil	1186	Richland	Sidney
Perry Petrolane	274	Richland	Sidney
KENCO	55	Roosevelt	Wolf Point
Western Energy Coal	* 46	Rosebud	Colstrip
Peabody Coal	* 18	Rosebud	Colstrip
Montana Power Colstrip #3	1644	Rosebud	Colstrip
ARCO Aluminum	1775	Flathead	Columbia Falls
Champion Int., Packaging Div.	1750	Missoula	Frenchtown
W. R. Grace	373	Lincoln	Libby
St. Regis Paper	25	Lincoln	Libby

*Includes tailpipe emissions from diesel powered vehicles.
**Estimated emissions for oil field gas flaring in the Williston Basin.

Table AP-F-II

POINT SOURCE PARTICULATE EMISSION ESTIMATES

Source	Part. Tons/Yr	County	City
Exxon Co. USA	1423	Yellowstone	Billings
Continental Oil Co.	320	Yellowstone	Billings
Montana Power Co. (Corette)	578	Yellowstone	Billings
East Decker Coal	* 910	Big Horn	Decker
Westmoreland Resources	* 601	Big Horn	Hardin
Cenex	643	Yellowstone	Billings
West Decker Coal	* 744	Bighorn	Decker
Spring Creek Coal	* 291	Bighorn	Decker
Great Western Sugar	2369	Yellowstone	Billings
Bighorn Calcium	* 284	Carbon	Warren
Kaiser Cement	*1495	Jefferson	Montana City
ASARCO smelter	734	Lewis&Clark	East Helena
Ideal Basic Industries	* 154	Gallatin	Trident
Stauffer Chemical Co.	941	Silver Bow	Ramsay
Pfizer Talc	408	Beaverhead	Dillon
Cyprus Industrial Minerals	23	Gallatin	Three Forks
Louisiana Pacific Corp.	152	Powell	Deer Lodge
Western Energy	*2521	Rosebud	Colstrip
Montana Power Co. 1&2	989	Rosebud	Colstrip
Peabody Coal	* 417	Rosebud	Colstrip
Montana Dakota Utilities	426	Richland	Sidney
Holly Sugar	81	Richland	Sidney
Montana Power Colstrip #3	1160	Rosebud	Colstrip
St. Regis Paper Co.	861	Lincoln	Libby
Missoula White Pine & Sash	* 177	Missoula	Missoula
Champion Int., Packaging Div.	1094	Missoula	Frenchtown
Champion/Bonner	102	Missoula	Bonner
Louisiana Pacific	705	Missoula	Missoula
Plum Creek Lumber	* 238	Lake	Pablo
Flathead Lumber	225	Lake	Polson
Plum Creek Lumber	254	Flathead	Columbia Falls
Plum Creek Lumber	90	Flathead	Kalispell
Flodin Lumber	* 53	Sanders	Thompson Falls
W. I. Forest Prod. Inc.	* 75	Sanders	Thompson Falls
American Timber	* 159	Flathead	Olney
Stoltze Land & Lumber	* 232	Flathead	Columbia Falls
Champion Int./Intermountain	76	Missoula	Missoula
Ksanka Lumber	* 86	Lincoln	Fortine
ARCO Aluminum	19	Flathead	Columbia
ASARCO Troy	* 190	Lincoln	Troy

*Fugitive emissions associated with mining and vehicle traffic are included.

APPENDIX G

Prevention of Significant Deterioration

APPENDIX G

PREVENTION OF SIGNIFICANT DETERIORATION

Prevention of Significant Deterioration (PSD) requirements were first introduced as part of the 1977 Amendments to the Clean Air Act.

These PSD requirements set limits for increases in ambient pollution levels and established a system for preconstruction review of new major sources. Three PSD classes have been established. Class I allows very small increases in pollution; Class II allows somewhat larger increases; and Class III allows the air quality to "deteriorate" considerably more. In general, Class I is designed for "pristine" areas where almost any deterioration would be significant. Congress established several types of mandatory Class I areas. These mandatory areas include international parks, wilderness areas larger than 5000 acres, national memorial parks larger than 5000 acres, and existing national parks larger than 6000 acres. All other areas of the country classified as attainment are Class II. Class II limits allow for moderate, well-controlled growth and Class III limits allow pollutant levels to increase considerably.

Table AP-G-I shows the allowable increases for the various classes. Table AP-G-II lists the federal Class I areas for Montana and Figure AP-1-G shows the locations of these areas on a map of Montana.

In 1978 the state of Montana established its own PSD rules. These rules were closely patterned after the Federal rules. In 1979 the EPA was sued by the Alabama Power Company over the Federal PSD rules. The court ruled that EPA had misinterpreted the intent of Congress. As a result the EPA rewrote their rules, which then differed from Montana's rules. The significant difference between the two sets of rules is that the state counted fugitive dust and uncontrolled plant emissions as part of the increment consumption.

Since 1979 the Air Quality Bureau has proceeded with rule-making to adopt an amended PSD rule which resembles the modified EPA rule. Final adoption of the Montana rule occurred January 28, 1983. EPA approved the new rule June 6, 1983 and delegated the entire responsibility for PSD to the state of Montana.

Table AP-G-I

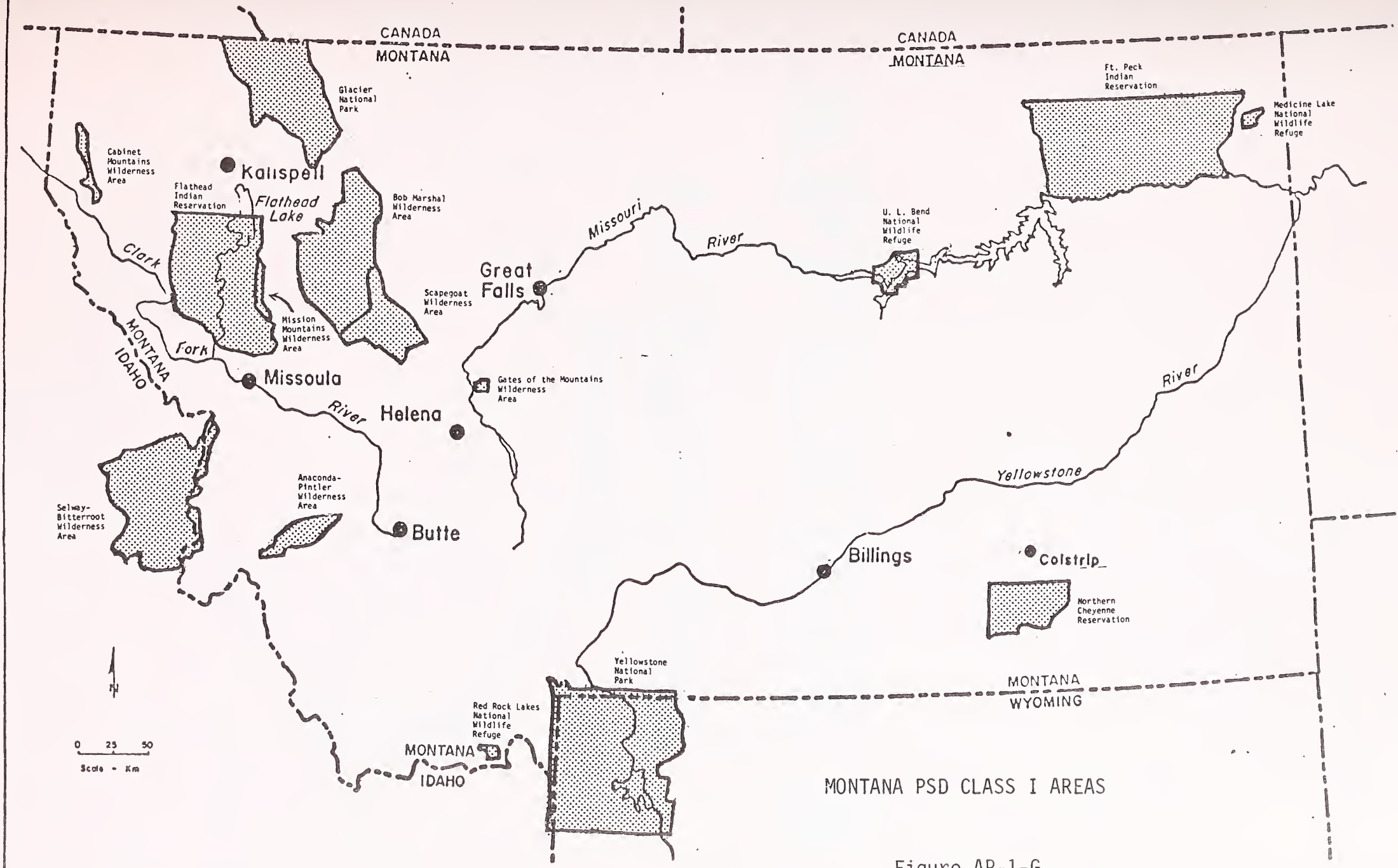
FEDERAL PREVENTION OF SIGNIFICANT DETERIORATION
ALLOWABLE INCREMENTS
Micrograms Per Cubic Meter

	I	II	III	Not to exceed
Particulates				
Annual Geo. Mean	5	19	37	75
Maximum 24-hour	10	37	75	150
Sulfur Dioxide				
Annual Arith. Mean	2	20	40	80
Maximum 24-hour	5	91	182	365
Maximum 3-hour	25	512	700	1300

Table AP-G-II

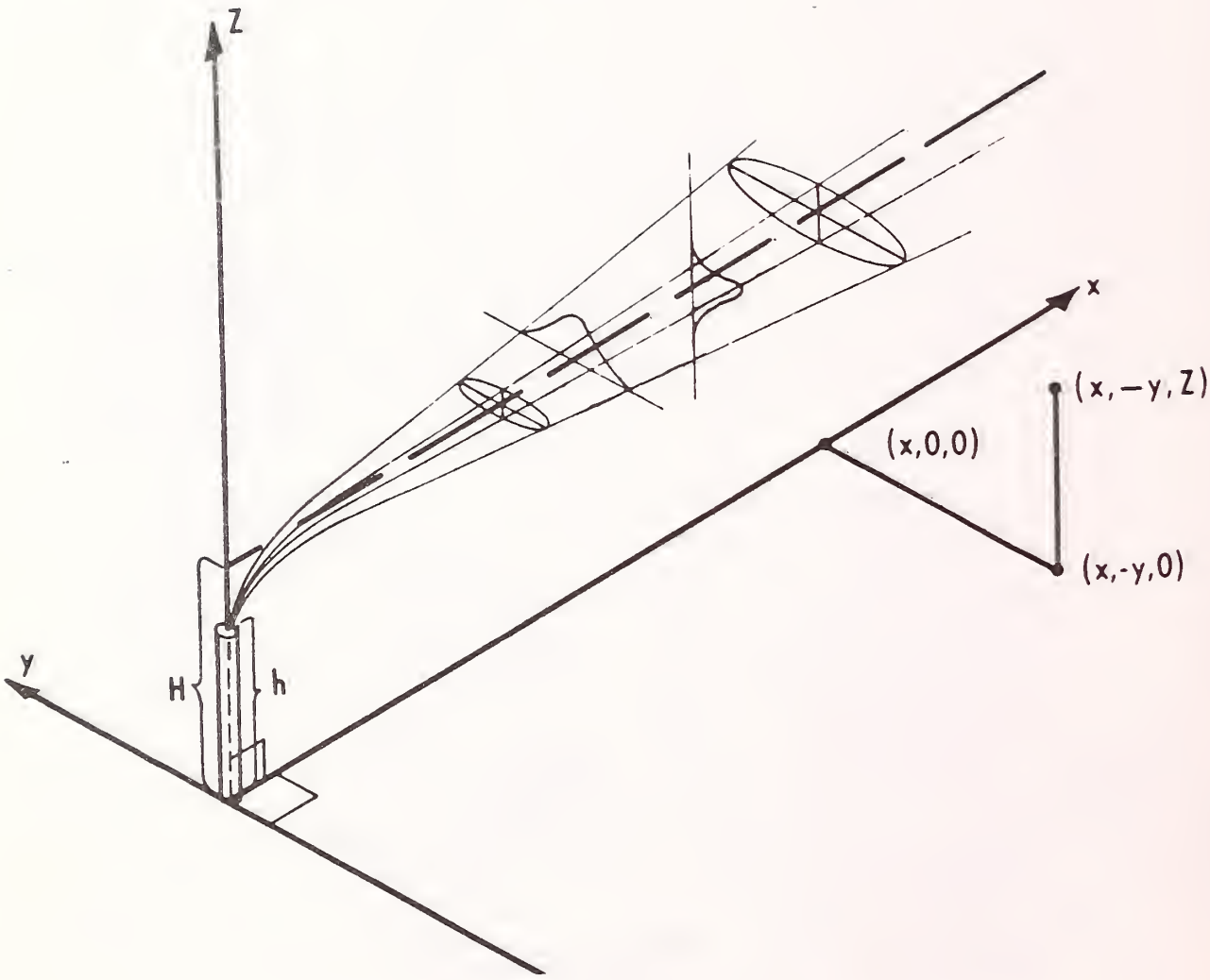
MONTANA FEDERAL CLASS I AREAS

Area	Location
Glacier National Park	NE Kalispell
Yellowstone National Park	S Bozeman
Bob Marshall Wilderness Area	SE Kalispell
Anaconda-Pintlar Wilderness Area	SW Anaconda
Selway-Bitterroot Wilderness Area	W Hamilton
Cabinet Mountains Wilderness Area	S Libby
Scapegoat Wilderness Area	NW Helena
Gates of the Mountains Wilderness Area	NE Helena
Mission Mountains Wilderness Area	SE Polson
Red Rock Lakes National Wildlife Refuge	S Virginia City
Medicine Lake National Wildlife Refuge	S Plentywood
U. L. Bend National Wildlife Refuge	SW Glasgow
Northern Cheyenne Reservation	SE Hardin
Flathead Indian Reservation	Near Polson & Ronan
Fort Peck Indian Reservation	N Wolf Point



MONTANA PSD CLASS I AREAS

Figure AP-1-G


Z
x
(x,−y,Z)
(x,0,0)
(x,-y,0)
y
H
h

APPENDIX H

Air Quality Data Reports

APPENDIX H
AIR QUALITY DATA REPORTS

This appendix has been put together to show the data user the varieties of air quality data reports that can be generated by the Department.

The Department uses EPA's Comprehensive Data Handling System (CDHS). This system has two sub-systems: Air Quality Data Handling System (AQDHS) and Emission Inventory System/Permits and Registration (EIS/P&R). The Department recently upgraded its AQDHS system to Version 29.

The following reports have been generated by AQDHS and EIS/P&R programs. They are listed as follows:

AQDHS - Detail List - Daily

AP-1-H Billings - City Hall - TSP - 1984
AP-2-H Great Falls - Fire Station #1 - TSP - 1984
AP-3-H Hamilton - Ravalli County Courthouse - TSP - 1984

AQDHS - Detail List - Hourly

AP-4-H Billings - Coburn Road - SO_2 - January 1984
AP-5-H Missoula - Boyd Park - CO - January 1984

AQDHS - Statistical Analysis by Month

AP-6-H Missoula - Hoerner Waldorf #2 - 1984
AP-7-H Sidney - Downtown - 1984

AQDHS - Statistical Analysis by Year

AP-8-H East Helena - Hastie Residence - 1984
AP-9-H Libby - Wrecking Yard - 1984

AQDHS - Standards Report

AP-10-H Columbia Falls - Anders Residence - TSP - 1984
AP-11-H East Helena - Firehall - Lead - 1984

EIS/P&R - Summary Report

AP-12-H Bozeman - Pioneer Ready Mix - Asphalt Plant
AP-13-H Fortine - Plum Creek-Ksanka - Tepee Burner
AP-14-H Sidney - UTEX Stateline Gas Plant - Flare Stack

STATE: MONTANA (27) AQDHS-II AIR QUALITY DATA REPORT DISPLAY NO9997 PAGE 192

AQCR: 140 AGENCY(G): COUNTY
CNTY: 1720 PROJECT(01): POPULATION-ORIENTED SURV.
AREA: 0080 PARM(11101): SUSPENDED PARTICULATE
SITE: 006 UNITS(01): MICROGRAMS/CUBIC METER
YEAR: 1984
LOCALE: CITY HALL, 3RD AVE NORTH & 27TH STREET BILLINGS

COLLECT METH: HI-VOL
ANALYSIS METH: GRAVIMETRIC
SAMPLING INTR: DAILY
SARDAD KEY: 27/0080/006/G/01
MINIMUM DETEC: 1
YELLOWSTONE

SLAMS/NAMS(2): SLAMS
RPT AGNCY/SMSA: / 0080
UTM ZONE: 12
UTM EASTING: 693.9210
UTM NORTHING: 5073.7100
TIME ZONE(05): MOUNTAIN

PRIMARY
FEDERAL STANDARD 260 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR
STATE STANDARD 200 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR

SECONDARY
150 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR

MONTH

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	NO.	MEAN	MAX
01	27		105										2	66.	105
02											143	37	2	90.	143
03									45	111			2	78.	111
04								80					1	80.	80
05						47	68						2	57.5	68
06		98		89	30								3	72.33	98
07	59		67										2	63.	67
08											75	107	2	91.	107
09									60	125			2	92.5	125
10								103					1	103.	103
11						34	91						2	62.5	91
12		61		50	69								3	60.	69
13	35		96										2	65.5	96
14											64	60	2	62.	64
15									63	39			2	51.	63
16								94					1	94.	94
17							100						1	100.	100
18		63		95	76								3	76.	95
19	39		85										2	62.	85
20											133	46	2	89.5	133
21									42	42			2	42.	42
22								92					1	92.	92
23						52	64						2	58.	64
24		97			43								2	70.	97
25	56		27										2	41.5	56
26											42	89	2	65.5	89
27									34	36			2	35.	36
28								131					1	131.	131
29							44						1	44.	44
30				56	96								2	76.	96
31	91		33										2	62.	91
NO	6	4	6	4	5	3	5	5	5	5	5	5	58		
MEAN	51.17	79.75	68.83	72.5	62.8	44.33	73.4	100.	48.8	70.6	91.4	67.8		69.59	
MAX	91	98	105	95	96	52	100	131	63	125	143	107			143

Figure AP-1-H

STATE: MONTANA (27) AQDHS-II AIR QUALITY DATA REPORT DISPLAY ND9997 PAGE 636

AQCR: 141 AGENCY(G): COUNTY
CNTY: 0220 PROJECT(01): POPULATION-ORIENTED SURV.
AREA: 0660 PARM(11101): SUSPENDED PARTICULATE
SITE: 009 UNITS(01): MICROGRAMS/CUBIC METER
YEAR: 1984
LOCALE: FIRE STATION #1 - 9TH ST & 1ST AVE SOUTH GREAT FALLS

COLLECT METH: HI-VOL
ANALYSIS METH: GRAVIMETRIC
SAMPLING INTR: DAILY
SAROAD KEY: 27/0660/009/G/01
MINIMUM DETEC: 1
CASCADE

SLAMS/NAMS(1): NAMS
RPT AGNCY/SMSA: / 3040
UTM ZONE: 12
UTM EASTING: 478.2210
UTM NORTHING: 5260.7360
TIME ZONE(05): MOUNTAIN

PRIMARY
FEDERAL STANDARD 260 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR
STATE STANDARD 200 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR

SECONDARY
150 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR

MONTH

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	NO.	MEAN	MAX
01	13		174										2	93.5	174
02											68	70	2	69.	70
03									45	119			2	82.	119
04				83		40		69					3	64.	83
05							98						1	98.	98
06		94			32								2	69.	94
07	100		58								123	45	2	79.	100
08													2	84.	123
09									32	140			2	86.	140
10								102					1	102.	102
11						16	93						2	54.5	93
12		72		51	94								3	72.33	94
13	34		46										2	40.	46
14											67	63	2	65.	67
15									74	33			2	53.5	74
16								89					1	89.	89
17						36	100						2	60.	100
18		93		55	64								3	70.67	93
19	45		175										2	110.	175
20											70	37	2	53.5	70
21									44	48			2	48.	48
22								76					1	76.	76
23						50	57						2	53.5	57
24		103		52									2	77.5	103
25	60		48										2	54.	60
26											114	35	2	74.5	114
27									46	41			2	43.5	46
28													0		
29						132	45						2	88.5	132
30				74	81								2	77.5	81
31	165		62										2	113.5	165
NO	6	4	6	5	4	5	5	4	5	5	5	5	59		
MEAN	69.5	90.5	93.83	63.	67.75	54.8	78.6	84.	48.2	76.2	88.4	50.		71.95	
MAX	165	103	175	83	94	132	100	102	74	140	123	70			175

Figure AP-2-H

STATE: MONTANA (27) AQDHS-11 AIR QUALITY DATA REPORT DISPLAY N>9997 PAGE 1363

AQCR: 144 AGENCY(F): STATE
CNTY: 1300 PROJECT(01): POPULATION-ORIENTED SURV.
AREA: 1300 PARM(11101): SUSPENDED PARTICULATE
SITE: 001 UNITS(01): MICROGRAMS/CUBIC METER
YEAR: 1984
LOCALE: RAVALLI COUNTY COURTHOUSE - 205 BEDFORD HAMILTON

COLLECT METH: HI-VOL
ANALYSIS METH: GRAVIMETRIC
SAMPLING INTR: DAILY
SAROAD KEY: 27/1300/001/F/01
MINIMUM DETEC: 1
RAVALLI

SLAMS/NAMS(3): OTHER/NOT CLASSIFIED
RPT AGNCY/SMSA: / 0000
UTM ZONE: 11
UTM EASTING: 719.1600
UTM NORTHING: 5124.9200
TIME ZONE(05): MOUNTAIN

PRIMARY
FEDERAL STANDARD 260 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR
STATE STANDARD 200 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR
SECONDARY
150 MICROGRAMS/CUBIC METER-24 HR MAX-1 PER YEAR

MONTH

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	NO.	MEAN	MAX
01			72										1	72.	72
02											13	66	2	39.5	66
03									27	59			2	43.	59
04								60					1	60.	60
05						29	79						2	54.	79
06		185		28	25								3	79.33	185
07	77		62										2	69.5	77
08											68	149	2	108.5	149
09									25	60			2	42.5	60
10								67					1	67.	67
11						22	119						2	70.5	119
12				57									1	57.	57
13	31												1	31.	31
14											31	78	2	54.5	78
15									38	39			2	38.5	39
16								30					1	30.	30
17						46	98						2	72.	98
18		43		30	50								3	41.	50
19			40										1	40.	40
20											38	97	2	67.5	97
21									26	51			2	38.5	51
22								80					1	80.	80
23						41	56						2	48.5	56
24		59			44								2	51.5	59
25	18		29										2	23.5	29
26											52		1	52.	52
27									29	15			2	22.	29
28								94					1	94.	94
29													0		
30					98								1	98.	98
31	267		74										2	170.5	267
NO	4	3	5	3	4	4	4	5	5	5	5	4	51		
MEAN	98.25	95.67	55.4	38.33	54.25	34.5	88.	66.2	29.	44.8	40.4	97.5		60.22	
MAX	267	185	74	57	98	46	119	94	38	60	68	149			267

Figure AP-3-H

STATE: MONTANA (27) ASDMS-II AIR QUALITY DATA REPORT DISPLAY N/9997 PAGE 495

AUCR: 140 AGENCY(F): STATE
CNTY: 1720 PROJECT(05): SPECIAL STUDIES
AREA: 0080 PARM(42401): SULFUR DIOXIDE
SITE: 066 UNITS(07): PARTS PER MILLION
YEAR: 1984 MONTH(01): JANUARY
LOCALE: COBURN ROAD, SOUTH OF BILLINGS

COLLECT METH: INSTRUMENTAL
ANALYSIS METH: PULSED FLOURESCENT
SAMPLING INTR: 01 HOURS
SAROAD KEY: 27/0080/066/F/05
MINIMUM DETEC: .002

SLAMS/NAMS(2): SLAMS
RPT AGNCY/SMSA: / 0000
UTM ZONE: 12
UTM EASTING: 697.5020
UTM NORTHING: 5073.2690
TIME ZONE(05): MOUNTAIN

BILLINGS YELLOWSTONE

PRIMARY
FEDERAL STANDARD .14 PARTS PER MILLION-24 HR MAX-1 PER YEAR
STATE STANDARD .5 PARTS PER MILLION-1 HR MAX-16 PER YEAR

SECONDARY
.5 PARTS PER MILLION-3 HR MEAN-1 PER YEAR

HOUR

DAY	00	01	02	03	04	05	06	07	08	09	10	11
01	0.028	0.049	0.067	0.030	0.008	0.007	0.033	0.034	0.034	0.063	0.093	0.062
02	0.068	0.061	0.020	0.016	0.011	0.048	0.005	0.003	0.000	0.004	0.027	0.012
03	0.032	0.033	0.072	0.046	0.051	0.026	0.054	0.096	0.038	0.024	0.057	0.102
04	0.153	0.079	0.021	0.050	0.066	0.029	0.014	0.009	0.012	0.108	0.034	0.029
05	0.041	0.019	0.013	0.017	0.050	0.042	0.010	0.017	0.048	0.067	0.092	
06	0.064	0.113	0.120	0.063	0.076	0.060	0.041	0.025	0.025	0.026	0.017	0.023
07	0.061	0.037	0.050	0.034	0.066	0.119	0.171	0.095	0.163	0.061	0.062	0.048
08	0.000	0.000	0.000	0.027	0.142	0.101	0.077	0.085	0.055	0.078	0.093	0.076
09	0.000	0.000	0.003	0.058	0.037	0.042	0.059	0.035	0.084	0.032	0.057	0.035
10	0.000	0.000	0.003	0.088	0.056	0.045	0.037	0.039				
11	0.034	0.079	0.037	0.092	0.128	0.074	0.126	0.096	0.086	0.000	0.000	0.000
12	0.028	0.042	0.057	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.105
13	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.013	0.000	0.000	0.000	0.000
14	0.000	0.010	0.004	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.014
15	0.009	0.026	0.025	0.035	0.062	0.140	0.067	0.122	0.137	0.094	0.071	0.097
16	0.017	0.011	0.013	0.009	0.009	0.000	0.000	0.019	0.000	0.000	0.000	0.000
17	0.000	0.004	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.003	0.005
18	0.054	0.036	0.024	0.023	0.013	0.023	0.081	0.100	0.101	0.081	0.076	0.047
19	0.016	0.023	0.049	0.050	0.053	0.029	0.060	0.044	0.026	0.014	0.009	0.014
20	0.012	0.064	0.078	0.090	0.056	0.162	0.159	0.148	0.129	0.058	0.062	0.067
21	0.084	0.208	0.220	0.200	0.212	0.025	0.117	0.110	0.165	0.066	0.058	0.035
22	0.051	0.043	0.042	0.035	0.070	0.038	0.034	0.087	0.096	0.030	0.036	0.036
23	0.028	0.070	0.070	0.033	0.034	0.050	0.063	0.060	0.050	0.031	0.009	0.024
24	0.055	0.027	0.031	0.013	0.019	0.025	0.047	0.035	0.023	0.021	0.026	0.032
25	0.022	0.025	0.034	0.035	0.023	0.036	0.017	0.016	0.020	0.027	0.016	0.026
26	0.039	0.036	0.034	0.005	0.022	0.081	0.076	0.066	0.049	0.040	0.007	0.011
27	0.056	0.061	0.065	0.056	0.063	0.059	0.018	0.092	0.074	0.025	0.043	0.013
28	0.027	0.068	0.101	0.075	0.023	0.017	0.034	0.022	0.073	0.007	0.032	0.023
29	0.000	0.001	0.001	0.000	0.001	0.002	0.001	0.001	0.001	0.001	0.000	0.000
30	0.075	0.107	0.070	0.087	0.072	0.036	0.023	0.015	0.023	0.078	0.072	0.008
31	0.016	0.018	0.019	0.021	0.048	0.069	0.116	0.029	0.016	0.020	0.013	0.012
NO	31	31	31	31	31	31	31	31	30	30	30	29
MEAN	.0351	.0448	.0435	.0415	.0481	.0447	.0496	.0488	.0509	.0391	.0364	.0336
MAX	0.153	0.208	0.220	0.200	0.212	0.162	0.171	0.148	0.165	0.108	0.093	0.105

Figure AP-4a-H

STATE: MONTANA (27) AQDHS-II AIR QUALITY DATA REPORT DISPLAY N>9997 PAGE 496

AQCR: 140 AGENCY(F): STATE
CNTY: 1720 PROJECT(05): SPECIAL STUDIES
AREA: 0090 PARM(42401): SULFUR DIUXIDE
SITE: 066 UNITS(07): PARTS PER MILLION
YEAR: 1984 MONTH(01): JANUARY
LOCALE: COBURN ROAD. SOUTH OF BILLINGS

COLLECT METH: INSTRUMENTAL
ANALYSIS METH: PULSED FLOURESCENT
SAMPLING INTR: 01 HOURS
SAROAD KEY: 27/0080/066/F/05
MINIMUM DETEC: .002

SLAMS/NAMS(2): SLAMS
RPT AGNCY/SMSA: / 0080
UTM ZONE: 12
UTM EASTING: 697.0020
UTM NORTHING: 5073.2890
TIME ZONE(05): MOUNTAIN

BILLINGS YELLOWSTONE

PRIMARY
FEDERAL STANDARD .14 PARTS PER MILLION-24 HR MAX-1 PER YEAR
STATE STANDARD .5 PARTS PER MILLION-1 HR MAX-16 PER YEAR

SECONDARY
.5 PARTS PER MILLION-3 HR MEAN-1 PER YEAR

HOUR

DAY	12	13	14	15	16	17	18	19	20	21	22	23	NO.	MEAN	MAX
01	0.072	0.065	0.023	0.013	0.029	0.085	0.045	0.084	0.035	0.032	0.034	0.061	24	.046	0.093
02	0.015	0.030	0.021	0.015	0.006	0.003	0.000	0.000	0.000	0.016	0.039	0.034	24	.0197	0.081
03	0.019	0.055	0.032	0.057	0.036	0.037	0.041	0.056	0.096	0.076	0.089	0.141	24	.0565	0.141
04	0.031	0.006	0.035	0.000	0.000	0.004	0.006	0.015	0.009	0.066	0.013	0.022	24	.0347	0.153
05		0.028	0.025	0.013	0.033	0.008	0.028	0.026	0.012	0.027	0.053	0.076	22	.0347	0.092
06	0.042	0.150	0.098	0.061	0.056	0.038	0.037	0.041	0.151	0.040	0.048	0.123	24	.064	0.150
07	0.167	0.090	0.051	0.046	0.052	0.038	0.003	0.010	0.009	0.000	0.000	0.000	24	.0606	0.171
08	0.067	0.038	0.004	0.005	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	24	.035	0.142
09	0.029	0.029	0.035	0.034	0.043	0.044	0.000	0.000	0.000	0.000	0.000	0.000	24	.0265	0.064
10	0.011	0.017	0.027	0.023	0.019	0.025	0.069	0.042	0.100	0.067	0.027	0.090	20	.0392	0.100
11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	24	.0317	0.136
12	0.105	0.107	0.137	0.112	0.004	0.003	0.007	0.017	0.000	0.000	0.000	0.000	24	.0304	0.137
13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.048	24	.0032	0.048
14	0.017	0.023	0.015	0.012	0.025	0.000	0.000	0.012	0.000	0.000	0.019	0.023	24	.0075	0.025
15	0.047	0.031	0.091	0.014	0.008	0.007	0.018	0.011	0.003	0.031	0.025	0.007	24	.049	0.140
16	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.006	0.001	0.002	0.013	0.003	24	.0044	0.019
17	0.000	0.012	0.016	0.030	0.010	0.025	0.011	0.042	0.065	0.027	0.033	0.083	24	.0163	0.083
18			0.004	0.004	0.014	0.022	0.008	0.019	0.010	0.018	0.035	0.024	22	.0365	0.101
19	0.024	0.021	0.074	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.002	24	.0224	0.074
20	0.021	0.007	0.003	0.003	0.039	0.065	0.058	0.042	0.047	0.018	0.021	0.024	24	.0315	0.162
21	0.104	0.062	0.081	0.048	0.062	0.013	0.016	0.059	0.040	0.036	0.015	0.043	24	.0567	0.220
22	0.097	0.144	0.034	0.027	0.063	0.051	0.029	0.030	0.027	0.018	0.041	0.028	24	.0466	0.144
23	0.035	0.071	0.034	0.056	0.025	0.046	0.012	0.052	0.008	0.023	0.047	0.038	24	.0403	0.071
24	0.069			0.033	0.018	0.013	0.018	0.027	0.008	0.008	0.016	0.021	22	.0265	0.069
25	0.038	0.036	0.049	0.026	0.008	0.012	0.006	0.001	0.002	0.012	0.036	0.054	24	.0252	0.049
26	0.017	0.002	0.004	0.001	0.013	0.032	0.038	0.085	0.077	0.053	0.031	0.071	24	.037	0.085
27	0.022	0.003	0.000	0.001	0.009	0.032	0.036	0.027	0.055	0.040	0.023	0.017	24	.017	0.092
28	0.043	0.003	0.015	0.076	0.064	0.035	0.063	0.057	0.044	0.014	0.013	0.011	24	.0416	0.101
29	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.026	0.012	0.009	0.011	0.020	24	.0038	0.026
30	0.008	0.084	0.044	0.056	0.028	0.015	0.013	0.011	0.011	0.012	0.025	0.016	24	.0412	0.107
31	0.010	0.006	0.003	0.016	0.017	0.027	0.042	0.037	0.046	0.040	0.037	0.033	24	.0297	0.116
NO	29	29	30	31	31	31	31	31	31	31	31	31	734		
MEAN	.0379	.0386	.0311	.0266	.0221	.0219	.0196	.0269	.0274	.0222	.0247	.0353		.0304	
MAX	0.167	0.150	0.137	0.112	0.064	0.085	0.069	0.085	0.131	0.076	0.089	0.141			0.220

Figure AP-4b-H

AQCR: 144 AGENCY(G): COUNTY
CNTY: 1100 PROJECT(02): SOURCE-ORIENTED AMBIENT SURV.
AREA: 1100 PARM(42101): CARBON MONOXIDE
SITE: 024 UNITS(07): PARTS PER MILLION
YEAR: 1984 MONTH(01): JANUARY
LOCALE: BOYD PARK - 3100 WASHBURN MISSOULA

COLLECT METH: INSTRUMENTAL
ANALYSIS METH: NONDISPERSIVE INFRA-RED
SAMPLING INTR: 01 HOURS
SAROAD KEY: 27/1100/024/G/02
MINIMUM DETEC: .5
MISSOULA

SLAMS/NAMS(2): SLAMS
RPT AGNCY/SMSA: / 0000
HEMISPHERES: LONG=WEST LAT=NORTH
LONGITUDE: DG=114 MIN=01 SEC=10
LATITUDE: DG=46 MIN=35 SEC=55
TIME ZONE(05): MOUNTAIN

PRIMARY
FEDERAL STANDARD 35 PARTS PER MILLION-1 HR MAX-1 PER YEAR
STATE STANDARD 23 PARTS PER MILLION-1 HR MAX-1 PER YEAR

SECONDARY
9 PARTS PER MILLION-8 HR MAX-1 PER YEAR

HOUR

DAY	00	01	02	03	04	05	06	07	08	09	10	11
01												
02												
03	2.5	2.5	1.5	1.0	0.3	0.0	0.0	1.0	1.8	1.8	3.3	4.6
04	3.5	3.3	3.8	3.3	3.0	2.5	2.8	5.0	8.5	8.3	8.3	7.8
05	1.0	1.3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.0	8.5	9.0
06	10.8	8.5	5.8	4.3	3.0	2.5	2.3	4.0	8.0	9.3	8.3	7.0
07	2.0	1.8	1.8	1.8	1.8	1.5	1.5	0.8	0.5	0.5	0.5	0.3
08	4.3	3.0	2.5	2.8	1.0	0.3	0.0	0.0	0.3	0.3	0.5	1.0
09	0.8	1.3	1.3	1.0	1.0	0.5	0.8	5.0	11.0	13.0	9.5	5.3
10	5.3		3.0	1.8	1.0	1.0	1.3	2.5	3.8	3.5	2.5	1.8
11	0.5	0.5	0.8	0.3	0.0	0.0	0.3	1.3	1.3	1.5		0.8
12	0.5	0.8	0.8	0.5	0.5	1.3	1.3	3.5	6.3	4.8	2.3	3.5
13	0.0	0.0	0.0	0.3	0.0	0.0	0.0	2.3	2.8	2.5	1.5	1.3
14	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3
15	3.0	2.8	2.3	1.5	1.8	1.8	1.3	1.8	1.3	1.3	1.3	1.5
16	1.3	1.0	0.8	0.5	0.8	0.5	0.8	1.8	4.5	3.0	2.3	2.8
17	0.3	0.0	0.3	0.0	1.0	1.8	3.5	8.5	9.3	3.5	1.5	1.0
18	3.8	3.3	3.0	1.3	1.0	1.0	1.3	5.5	6.3	4.0	2.3	1.8
19	4.3	3.5	4.0	2.5	2.8	2.0	2.3	5.5	5.8	3.5	2.8	
20	6.0	4.5	3.3	2.0	2.0	2.0	2.5	5.0	6.8	6.8	4.0	2.8
21	3.3	2.5	3.0	2.5	2.0	1.8	1.8	1.8	1.8	1.8	1.5	1.8
22	3.8	2.5	2.5	2.8	2.5	2.8	3.0	3.0	2.0	1.8	2.0	2.0
23	0.8	1.0	0.5	0.5	0.8	1.3	0.8	1.8	5.5	4.0	4.0	3.3
24	2.0	1.8	1.0	0.8	0.8	0.5	1.5	3.0	4.8	4.8	3.3	4.8
25	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.0	0.8	0.0	0.0
28											0.8	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	1.5	0.5
30	2.0	1.8	1.5	1.5	1.3	1.3	2.5	6.5	7.5	6.5		0.8
31	4.3	4.3	4.3	3.3	2.0	1.0	0.5	1.8	4.5	2.3	1.3	1.0
NO	28	27	28	28	28	28	28	28	28	28	27	28
MEAN	2.425	1.948	1.761	1.35	1.139	1.032	1.2	2.643	3.864	3.371	2.744	2.393
MAX	10.8	8.5	5.8	4.3	3.0	2.8	3.5	8.5	11.0	13.0	9.5	9.0

Figure AP-5a-H

STATE: MONTANA (27) AQDHS-II AIR QUALITY DATA REPORT DISPLAY N>9997 PAGE 1333

AQCR: 144 AGENCY(G): COUNTY
CNTY: 1100 PROJECT(02): SOURCE-ORIENTED AMBIENT SURV.
AREA: 1100 PARM(42101): CARBON MONOXIDE
SITE: 024 UNITS(07): PARTS PER MILLION
YEAR: 1984 MONTH(01): JANUARY
LOCALE: BOYD PARK - 3100 WASHBURN MISSOULA

COLLECT METH: INSTRUMENTAL
ANALYSIS METH: NONDISPERSIVE INFRA-RED
SAMPLING INTR: 01 HOURS
SAROAD KEY: 27/1100/024/G/02
MINIMUM DETEC: .5
MISSOULA

SLAMS/NAMS(2): SLAMS
RPT AGNCY/SMSA: / 0000
HEMISPHERES: LONG=WEST LAT=NORTH
LONGITUDE: DG=114 MIN=01 SEC=10
LATITUDE: DG=46 MIN=35 SEC=55
TIME ZONE(05): MOUNTAIN

PRIMARY SECONDARY
FEDERAL STANDARD 35 PARTS PER MILLION-1 HR MAX-1 PER YEAR 9 PARTS PER MILLION-8 HR MAX-1 PER YEAR
STATE STANDARD 23 PARTS PER MILLION-1 HR MAX-1 PER YEAR

	HOUR														
DAY	12	13	14	15	16	17	18	19	20	21	22	23	NO.	MEAN	MAX
01													0		
02									3.3	2.3	3.5	4.0	4	3.275	4.0
03	5.3	2.8		5.8	5.0	11.8	10.8	5.5	6.5	6.0	5.5	4.0	23	4.022	11.8
04	6.8	9.0	6.3	5.8	6.0	9.0	7.5	6.5	4.8	3.0	2.3	1.5	24	5.442	9.0
05	8.8	6.8	5.3	4.3	8.0	12.0	14.8	16.5	15.0	13.5	12.5	11.3	24	8.796	16.5
06	3.8	3.5	3.8	4.0	5.5	7.3	9.5	11.0	9.0	7.8	5.3	3.0	24	6.138	11.0
07	0.3	0.8	1.3	1.5	2.3	2.8	3.3	2.3	2.3	2.3	3.5	4.5	24	1.75	4.5
08	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.3	1.3	1.0	24	.9041	4.3
09	2.3	0.8	0.5	0.3	0.3	2.5	5.0	6.8	6.5	6.3	7.3	7.0	24	4.004	13.0
10	2.5	2.5			3.5	3.8	0.8	0.3	0.8	1.3	0.5	0.8	21	2.11	5.3
11	1.3	1.3	0.8	1.3	0.8	1.3	2.3	2.3	3.3	2.8	1.3	0.3	23	1.148	3.3
12	1.8	1.5	1.0	1.3	1.5	2.0	2.3	1.3	0.8	0.8	0.3	0.5	24	1.717	6.3
13	1.0	0.5	0.3		0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	23	.5826	2.8
14	0.3	0.3	0.3	0.3	0.3	0.8	1.0	1.8	2.0	2.0	2.5	2.8	24	.675	2.8
15	1.8	1.8	1.3	1.3	1.3	1.5	2.3	2.3	2.8	2.8	2.3	2.3	24	1.896	3.0
16	2.8	1.0		0.5	0.5	0.3	0.3	0.3	0.0	0.0	0.0	0.0	23	1.122	4.5
17	1.0	1.3		1.5	1.8	6.0	6.0	7.0	8.0	7.3	6.5	5.3	23	5.583	9.3
18	2.0	1.8	2.3	2.5	2.8	4.5	8.5	10.3	9.3	7.8	8.0	6.8	24	4.217	10.3
19	2.3	2.0	1.8	2.3	2.8	5.5	9.0	11.0	8.8	8.8	10.0	9.5	23	4.904	11.0
20	2.8	3.0	3.0	3.3	3.0	3.5	4.5	7.3	8.3	5.5	4.8	3.8	24	4.188	8.3
21	2.0	2.5	2.8	2.8	2.3	3.3	3.3	2.8	5.5	5.3	2.8	3.3	24	2.513	3.5
22	2.8	1.0	0.3	0.3	0.8	3.0	2.0	1.3	1.3	0.5	0.5	0.5	24	1.696	3.8
23		2.5	1.0	0.3	0.3	2.5	2.3	0.8	0.5	1.3	1.3	1.8	23	1.691	5.5
24		2.0	3.3	5.0	6.3	4.5	3.5	2.3	3.0	2.3	2.5	2.8	23	2.896	6.3
25	0.0	0.0		0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	23	.1347	1.5
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24	.0	0.0
27	0.0												15	.2	1.0
28	0.0	0.0	0.0	0.0	0.0	0.5	1.8	0.8	0.8	0.0	0.0	0.0	14	.3357	1.8
29	0.0	0.0	0.0	0.0	0.0	0.5	1.3	1.5	2.0	2.3	2.8	2.3	24	.6541	2.8
30	1.3	0.5	0.0	0.3	1.3	3.0	6.3	6.8	5.5	8.3	7.0	5.5	23	3.435	8.3
31	0.8	0.3	0.0	0.3	0.8	3.5	7.3	9.3	9.5	7.3	8.3	5.3	24	3.471	9.5
NO	27	28	23	26	28	28	28	28	29	29	29	29	666		
MEAN	2.104	1.779	1.539	1.731	2.054	3.436	4.132	4.236	4.083	3.755	3.572	3.11		2.576	
MAX	8.8	9.0	6.3	5.8	8.0	12.0	14.8	16.5	15.0	13.5	12.5	11.3			16.5

Figure AP-5b-H

SITE CODE: 27-1100-016-G-02 AGENCY TYPE: COUNTY COUNTY: 1100
AGENCY/PROJECT: 002 SITE ADDRESS: HUERNER WALDORF #2 - WELL FIELD CITY: MISSOULA

POLLUTANT NAME / POLLUTANT-METHOD-INTERVAL-UNITS CODE / YR/MON	PCT OBS	NBR OBS	MIN DETEC	MIN OBS	METHOD OF COLLECTION AND ANALYSIS	PERCENTILES 10	30	50	70	90	95	99	MAX OBS	2ND MAX	3RD MAX	ARIT MEAN	ARIT ST DEV	GEOM MEAN	GEOM ST DEV	TIMES HALF M DET SUB
SUSPENDED PARTICULATE					HI-VOL					- GRAVIMETRIC						INTERVAL DAILY		UNITS MICROGRAMS/CUBIC METER		
11101-01-G-01																				
84/01	29.0	9	1.000	6.000		6.	15.	16.	26.	49.	49.	49.	49.00	69.00	26.00	33.55	34.69	22.46	2.450	0
84/02	34.5	10	1.000	5.000		7.	8.	12.	24.	28.	35.	35.	35.00	28.00	20.00	17.20	10.71	13.99	2.024	0
84/03	32.3	10	1.000	5.000		5.	6.	8.	11.	19.	24.	24.	24.00	19.00	12.00	10.90	6.118	9.640	1.603	0
84/04	33.3	10	1.000	5.000		8.	10.	17.	20.	27.	38.	38.	38.00	27.00	24.00	18.30	9.764	15.79	1.633	0
84/05	32.3	10	1.000	9.000		14.	20.	22.	26.	26.	30.	30.	26.00	26.00	26.00	22.50	7.575	21.15	1.481	0
84/06	30.0	9	1.000	6.000		6.	15.	26.	38.	42.	42.	42.	42.00	35.00	35.00	25.55	11.63	22.36	1.643	0
84/07	32.3	10	1.000	18.00		29.	33.	35.	38.	45.	70.	70.	70.00	45.00	44.00	37.60	13.01	35.80	1.414	0
84/08	35.5	11	1.000	13.00		25.	29.	35.	47.	53.	65.	65.	65.00	53.00	49.00	37.64	15.61	34.53	1.576	0
84/09	33.3	10	1.000	6.000		7.	15.	15.	40.	56.	61.	61.	61.00	56.00	57.00	29.70	22.10	21.92	2.377	0
84/10	32.3	10	1.000	5.000		7.	13.	18.	32.	53.	70.	70.	70.00	52.00	51.00	27.70	22.63	19.49	2.517	0
84/11	33.3	10	1.000	4.000		6.	12.	16.	26.	36.	47.	47.	47.00	36.00	24.00	19.80	13.07	15.77	2.156	0
84/12	32.3	10	1.000	5.000		5.	17.	37.	43.	79.	102.	102.	102.0	79.00	71.00	40.80	33.09	26.17	3.048	0
SULFATE					HI-VOL					- COLORIMETRIC						DAILY		MICROGRAMS/CUBIC METER		
12403-01-G-01																				
84/01	29.0	9	0.500	0.700		0.7	2.2	3.6	8.0	10.5	10.5	10.5	10.50	9.200	8.000	4.700	3.623	3.345	2.693	0
84/02	34.5	10	0.500	0.900		1.1	1.3	1.7	3.5	3.9	3.9	3.9	3.900	3.900	3.500	2.370	1.291	2.034	1.820	0
84/03	32.3	10	0.500	0.800		1.1	1.3	1.5	2.3	2.5	3.2	3.2	3.200	2.500	2.400	1.750	0.789	1.597	1.609	0
84/04	33.3	10	0.500	1.300		1.4	2.3	2.4	3.1	3.5	3.7	3.7	3.700	3.500	3.200	2.520	0.827	2.363	1.441	0
84/05	32.3	10	0.500	1.100		1.5	2.2	2.4	2.4	2.8	2.8	2.8	2.800	2.800	2.700	2.250	0.529	2.179	1.327	0
84/06	30.0	9	0.500	1.200		1.2	1.7	2.1	2.3	2.8	2.8	2.8	2.800	2.800	2.300	2.044	0.502	1.985	1.300	0
84/07	32.3	10	0.500	1.700		1.9	2.2	2.3	2.4	2.6	2.9	2.9	2.900	2.800	2.500	2.450	0.352	2.425	1.170	0
84/08	35.5	11	0.500	2.300		2.5	2.6	3.1	3.1	3.6	3.8	3.8	3.800	3.800	3.200	2.954	0.401	2.922	1.168	0
84/09	33.3	10	0.500	1.100		1.2	1.6	1.8	2.9	4.2	4.7	4.7	4.700	4.200	3.900	2.700	1.383	2.423	1.742	0
84/10	32.3	10	0.500	0.800		1.2	3.2	3.5	5.0	6.4	6.9	6.9	6.900	6.400	5.900	4.200	2.140	3.535	2.003	0
84/11	33.3	10	0.500	1.000		1.0	1.4	1.7	2.7	3.4	3.5	3.5	3.500	3.400	2.600	2.150	0.959	1.948	1.621	0
84/12	32.3	10	0.500	1.100		1.1	2.4	2.9	5.5	12.1	12.2	12.2	12.20	12.10	0.000	4.240	4.215	3.393	2.480	0

Figure AP-6-H

SITE CODE: 27-1320-010-F-01 AGENCY TYPE: STATE COUNTY: 1320
AGENCY/PROJECT: F01 SITE ADDRESS: SIDNEY DOWNTOWN - 115 2ND ST SE CITY: SIDNEY

POLLUTANT NAME / POLLUTANT-METHOD-INTERVAL-UNITS CODE / YR/MON	PCT OBS	NBR OBS	MIN DETEC	MIN OBS	PERCENTILES 10	30	50	70	90	95	99	MAX OBS	2ND MAX	3RD MAX	ARIT MEAN	ARIT ST DEV	GEOM MEAN	GEOM ST DEV	TIMES HALF M DET SUB
METHOD OF COLLECTION AND ANALYSIS:														INTERVAL:		UNITS:			
SUSPENDED PARTICULATE					HI-VOL				- GRAVIMETRIC					DAILY		MICROGRAMS/CUBIC METER			
11101-91-F-01																			
84/04	3.3	1	1.000	155.0	155.	155.	155.	155.	155.	155.	155.	155.0	N/A	N/A	155.0	0.000	155.0	1.000	0
84/05	19.1	5	1.000	76.00	76.	88.	96.	128.	132.	132.	132.	132.0	128.0	96.00	104.0	24.51	101.0	1.271	0
84/06	16.7	5	1.000	27.00	27.	42.	43.	47.	79.	79.	79.	79.00	47.00	43.00	47.00	19.12	44.02	1.466	0
84/07	9.7	3	1.000	65.00	65.	65.	74.	75.	75.	75.	75.	75.00	74.00	65.00	71.33	5.507	71.16	1.082	0
84/08	16.1	5	1.000	69.00	69.	80.	110.	117.	118.	118.	118.	118.0	117.0	110.0	96.80	22.73	90.53	1.279	0
84/09	13.3	4	1.000	25.00	25.	41.	41.	73.	78.	78.	78.	78.00	73.00	41.00	54.25	25.47	49.15	1.707	0
84/10	6.5	2	1.000	30.00	30.	30.	30.	45.	45.	45.	45.	45.00	30.00	N/A	37.50	10.60	36.74	1.332	0
84/11	6.7	2	1.000	45.00	45.	45.	45.	67.	67.	67.	67.	67.00	45.00	N/A	56.00	15.55	54.90	1.325	0
84/12	9.7	3	1.000	40.00	40.	40.	47.	233.	233.	233.	233.	233.0	47.00	40.00	106.6	109.4	75.94	2.049	0
NITRATE					HI-VOL				- REDUCTION-DIAZO COUPLING					DAILY		MICROGRAMS/CUBIC METER			
12306-92-F-01																			
84/04	3.3	1	0.050	1.200	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.200	N/A	N/A	1.200	0.000	1.200	1.000	0
84/05	19.1	5	0.050	0.500	0.5	0.6	0.7	0.8	0.8	0.8	0.8	0.800	0.800	0.700	0.680	0.130	0.669	1.223	0
84/06	16.7	5	0.050	0.300	0.3	0.3	0.7	1.9	3.8	3.8	3.8	3.800	1.900	0.700	1.400	1.493	0.884	3.091	0
84/07	9.7	3	0.050	0.500	0.5	0.5	0.7	0.9	0.9	0.9	0.9	0.900	0.700	0.500	0.700	0.200	0.660	1.343	0
84/08	19.1	5	0.050	0.500	0.5	0.6	0.7	1.6	2.6	2.6	2.6	2.600	1.600	0.700	1.240	0.923	0.996	2.073	0
84/09	13.3	4	0.050	0.200	0.2	0.5	0.5	0.5	0.8	0.8	0.8	0.800	0.500	0.500	0.500	0.244	0.447	1.768	0
SULFATE					HI-VOL				- COLORIMETRIC					DAILY		MICROGRAMS/CUBIC METER			
12403-91-F-01																			
84/04	3.3	1	0.500	3.400	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.400	N/A	N/A	3.400	0.000	3.400	1.000	0
84/05	19.1	5	0.500	2.400	2.4	2.6	2.7	3.0	4.1	4.1	4.1	4.100	3.800	2.700	3.060	0.716	2.997	1.252	0
84/06	16.7	5	0.500	3.400	3.5	3.7	5.1	6.0	6.4	6.4	6.4	6.400	6.000	5.100	5.020	1.209	4.901	1.279	0
84/07	9.7	3	0.500	3.900	3.9	3.9	4.5	4.5	4.5	4.5	4.5	4.500	4.200	3.900	4.300	0.346	4.290	1.088	0
84/08	16.1	5	0.500	3.400	3.4	3.3	6.7	7.0	13.4	13.4	13.4	13.40	7.000	6.700	7.360	3.809	6.696	1.626	0
84/09	12.9	4	0.500	4.700	4.7	4.8	4.8	5.3	5.4	5.4	5.4	5.400	5.300	4.800	5.050	0.351	5.040	1.072	0
84/10	6.5	2	0.500	3.700	3.7	3.7	3.7	3.4	3.4	3.4	3.4	3.400	3.700	N/A	3.050	1.909	4.500	1.473	0
84/11	6.7	2	0.500	3.100	3.1	3.1	3.1	3.4	3.4	3.4	3.4	3.400	3.100	N/A	4.750	2.333	4.404	1.569	0
84/12	9.7	3	0.500	4.200	4.2	4.2	4.7	5.5	5.5	5.5	5.5	5.500	4.700	4.200	4.600	0.655	4.570	1.145	0

Figure AP-7-H

SITE CODE: 27-0660-002-F-02 AGENCY TYPE: STATE COUNTY: 0660
AGENCY/PROJECT: PO2 SITE ADDRESS: HASTIE RESIDENCE - 212 PACIFIC ST CITY: EAST HELENA

POLLUTANT NAME / POLL-METH-INTRV-UNITS CODE / METHOD OF COLLECTION AND ANALYSIS	YEAR	PCT OBS	NUM OBS	MIN DETEC	MIN OBS	10	20	50	70	90	95	99	MAX OBS	2ND MAX	3RD MAX	INTERVAL	UNITS	ARIT MEAN	ARIT ST DEV	GEOM MEAN	GEOM ST DEV	TIMES HALF M DET SUB
SUSPENDED PARTICULATE 11101-91-6-01						HI-VOL					- GRAVIMETRIC					DAILY	MICROGRAMS/CUBIC METER					
	84	29.2	107	1.000	11.00	29.	43.	52.	67.	95.	104.	115.	141.0	115.0	114.0			57.00	24.66	51.51	1.602	0
ARSENIC 12103-90-6-01						HI-VOL					- EMISSION SPECTRA ICAP					DAILY	MICROGRAMS/CUBIC METER					
	84	29.2	107	0.020	0.000	0.040	0.11x	0.157	0.226	0.419	0.499	0.620	0.620	0.620	0.557			0.195	0.150	0.142	2.370	2
CADMIUM 12110-90-6-01						HI-VOL					- EMISSION SPECTRA ICAP					DAILY	MICROGRAMS/CUBIC METER					
	84	29.2	107	0.003	0.000	0.012	0.044	0.075	0.117	0.286	0.367	0.670	0.540	0.670	0.663			0.117	0.136	0.065	3.344	2
COPPER 12114-90-6-01						HI-VOL					- EMISSION SPECTRA ICAP					DAILY	MICROGRAMS/CUBIC METER					
	84	29.2	107	0.003	0.190	0.55	0.64	0.97	1.81	3.73	4.91	6.19	10.24	6.190	6.010			1.646	2.180	1.056	2.436	0
LEAD 12128-90-6-01						HI-VOL					- EMISSION SPECTRA ICAP					DAILY	MICROGRAMS/CUBIC METER					
	84	29.2	107	0.010	0.090	0.67	1.46	2.25	3.31	6.21	8.07	11.09	12.69	11.09	10.25			2.666	2.411	2.060	2.376	0
ZINC 12167-90-6-01						HI-VOL					- EMISSION SPECTRA ICAP					DAILY	MICROGRAMS/CUBIC METER					
	84	29.2	107	0.010	0.080	0.39	1.02	1.60	2.44	3.63	4.70	7.04	13.29	7.040	5.000			1.976	1.711	1.414	2.446	0

Figure AP-8-H

SITE CODE: 27-0940-010-F-05 AGENCY TYPE: STATE COUNTY: 0940
AGENCY/PROJECT: FCS SITE ADDRESS: WRECKING YARD - IMPOUND YARD - 5TH & MAIN CITY: LIBBY

POLLUTANT NAME / POLL-METH-INTRV-UNITS CODE / YEAR	PCT OBS	NBR OBS	MIN DETEC	MIN OBS	METHOD OF COLLECTION AND ANALYSIS / PERCENTILES 10	30	50	70	90	95	99	MAX OBS	2ND MAX	INTERVAL 3RD MAX	UNITS ARIT MEAN	ARIT ST DEV	GEOM MEAN	GEOM ST DEV	TIMES HALF M DET SUB
BETA (LIGHT) SCATTER					INSTRUMENTAL				- NEPHELOMETER					HOURLY	SCATTER COEF (X10**5)				
11203-11-1-27																			
84	19.6	1719	0.100	2.200	8.7	25.2	44.7	66.7	91.1	92.7	93.1	93.10	93.10	93.10	47.62	29.59	35.62	2.362	0
CARBON MONOXIDE					INSTRUMENTAL				- NONDISPERSIVE INFRA-RED					HOURLY	PARTS PER MILLION				
42101-11-1-07																			
84	10.1	885	0.500	0.000	1.0	1.5	2.0	3.0	4.5	5.2	6.5	9.000	8.500	8.000	2.255	1.437	1.936	1.930	13

Figure AP-9-H

PARTICULATE
DAILY VALUES

REPORT DATE: APRIL 12, 1995

STATE (27): MONTANA

SITE CODE: 27-0270-005
AGENCY (F): STATE
PROJECT (C): POPULATION-ORIENTED SURVe
CITY POPULATION:
AQCR POPULATION:
EPA REGION: 8
SUPPORTING AGENCY: MONTANA AIR QUALITY BUREAU

LOCATION: COLUMBIA FALLS
COUNTY (0480): FLATHEAD
SITE ADDR: ANDERS RESIDENCE, 726 FIRST STREET
STATION TYPE (12): CENTER CITY: RESIDENTIAL
AQCR: 144 SMSA: 0000
SLAMS/NAMS ID (2): SLAMS

LATITUDE: N48 D. 22 M. 20 S.
LONGITUDE: W114 D. 10 M. 40 S.
UTM ZONE: 11
UTM NORTHING: 5361.3020 M.
UTM EASTING: 709.0030 M.
ELEVATION ABOVE GROUND: 5.0 M.
ELEVATION ABOVE MSL: 2,800 FT.
TIME ZONE: MOUNTAIN

COLLECTION METHOD: HI-VOL

ANALYSIS METHOD: GRAVIMETRIC

DAY	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	66 S	9999 W	103 T	9999 S	9999 T	9999 F	9999 S	9999 W	9999 S	9999 M	9999 T	9999 S
2	9999 M	9999 T	9999 W	9999 M	9999 W	9999 S	9999 M	9999 T	9999 S	9999 T	73 F	43 S
3	9999 T	9999 F	9999 T	9999 T	9999 T	9999 S	9999 T	9999 F	112 M	124 W	9999 S	9999 M
4	9999 W	9999 S	9999 F	9999 W	9999 F	9999 M	9999 W	71 S	9999 T	9999 T	9999 S	9999 T
5	9999 T	9999 M	9999 S	9999 T	9999 S	48 T	195 T	9999 S	9999 W	9999 F	9999 M	9999 W
6	9999 F	407* T	9999 S	64 F	46 S	9999 W	9999 F	9999 M	9999 T	9999 S	9999 T	9999 T
7	9999 S	9999 T	236 M	9999 S	9999 M	9999 T	9999 S	9999 T	9999 F	9999 S	9999 W	9999 F
8	9999 S	9999 W	9999 T	9999 S	9999 T	9999 F	9999 S	9999 W	9999 S	9999 M	52 T	94 S
9	9999 M	9999 T	9999 W	9999 M	9999 W	9999 S	9999 M	9999 T	71 T	9999 T	9999 F	9999 S
10	9999 T	9999 F	9999 T	9999 T	9999 T	9999 S	9999 T	202 F	9999 W	9999 W	9999 S	9999 M
11	9999 W	9999 S	9999 F	9999 W	9999 F	101 M	172 W	9999 S	9999 T	9999 T	9999 S	9999 T
12	9999 T	61 S	9999 S	68 T	169 S	9999 T	9999 T	9999 S	9999 M	9999 F	9999 M	9999 W
13	9999 F	9999 M	46 M	9999 F	9999 S	9999 W	9999 T	9999 M	9999 T	9999 S	9999 T	9999 T
14	9999 S	9999 T	9999 W	9999 S	9999 M	9999 T	9999 F	9999 T	9999 F	9999 S	67 W	66 F
15	9999 S	9999 W	9999 T	9999 S	9999 T	9999 F	9999 S	9999 W	9999 S	60 M	9999 T	9999 S
16	9999 M	9999 T	9999 F	9999 M	9999 W	9999 S	9999 M	131 T	9999 T	9999 F	9999 S	9999 S
17	9999 T	9999 F	9999 S	9999 T	9999 T	126 S	152 T	9999 F	9999 M	9999 W	9999 S	9999 M
18	9999 W	202* S	9999 S	52 W	106 F	9999 M	9999 W	9999 S	9999 T	9999 T	9999 S	9999 T
19	9999 T	9999 M	52 M	9999 T	9999 S	9999 T	9999 T	9999 S	9999 W	9999 F	9999 S	9999 W
20	9999 F	9999 T	9999 T	9999 F	9999 S	9999 W	9999 F	9999 M	9999 T	9999 S	92 T	109 T
21	9999 S	9999 W	9999 W	9999 S	9999 M	9999 T	9999 S	9999 T	9999 F	9999 S	9999 W	9999 F
22	9999 S	9999 T	9999 T	9999 S	9999 T	9999 F	9999 S	158 W	9999 S	9999 M	9999 T	9999 S
23	9999 M	9999 F	9999 W	9999 M	9999 W	73 S	182 M	9999 T	9999 S	9999 T	9999 F	9999 S
24	9999 T	59 S	9999 T	162 T	65 T	9999 S	9999 T	9999 F	9999 M	9999 W	9999 S	9999 M
25	16 W	9999 S	44 F	9999 W	9999 F	9999 M	9999 W	9999 S	9999 T	9999 T	9999 S	9999 T
26	9999 T	9999 M	9999 F	9999 T	9999 S	9999 T	9999 T	9999 S	9999 W	9999 F	200 M	13 W
27	9999 F	9999 T	9999 F	9999 S	9999 S	9999 W	9999 F	9999 S	56 T	24 S	T	T
28	9999 S	9999 W	9999 S	9999 M	9999 T	9999 S	9999 S	437* T	F	S	W	F
29	9999	9999 T	9999 S	9999 T	302* F	66 S	S	W	S	M	T	S
30	9999 T	9999 F	164 M	153 W	S	T	T	T	S	T	F	S
31	200 T	119 S	T	T				F		W		M
	4	5	4	6	5	5	5	5	4	5	5	5
MAX	200	407	236	162	152	302	195	437	112	157	200	109
GEO MEAN	63	154	82	93	94	108	144	167	65	76	86	52

TOTAL SAMPLES = 60
GEOMETRIC MEAN = 91
GEOMETRIC STANDARD DEVIATION = 2.03
MAXIMUM = 437
TOTAL PRIMARY EXCEEDANCES = 4
TOTAL SECONDARY EXCEEDANCES = 17
*** MEAN EXCEEDS PRIMARY STANDARD AND EXCEEDS SECONDARY STANDARD OF 75 AND 60 MICROGRAMS PER CUBIC METER, RESPECTIVELY

* INDICATES ITEM EXCEEDED PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER
+ INDICATES ITEM EXCEEDED SECONDARY STANDARD OF 150 MICROGRAMS PER CUBIC METER

Figure AP-10-H

L E A F

REPORT DATE: APRIL 12, 1985 DAILY VALUES STATE (27): MONTANA

SITE CODE: 27-0860-714 LOCATION: EAST HELENA LATITUDE: N46 D. 35 M. 20 S.
AGENCY (F): STATE COUNTY (0860): LEWIS & CLARK LONGITUDE: W111 D. 55 M. 13 S.
PROJECT (02): SOURCE-ORIENTED AMBIENT SURV. SITE ADDR: FIREHALL - 2 EAST PACIFIC ST UTM ZONE: 12
CITY POPULATION: STATION TYPE (12): CENTER CITY: RESIDENTIAL UTM NORTHING: 5139.7000 M.
AQCR POPULATION: AQCR: 142 SMSA: 0000 UTM EASTING: 429.5000 M.
EPA REGION: 8 SLAMS/NAMS ID (2): SLAMS ELEVATION ABOVE GROUND: 6.0 M.
SUPPORTING AGENCY: MONTANA AIR QUALITY BUREAU ELEVATION ABOVE MSL: 3,900 FT.
TIME ZONE: MOUNTAIN

COLLECTION METHOD: HI-VOL ANALYSIS METHOD: EMISSION SPECTRA ICAP

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	3.750 S	999.900$W	4.980 T	999.900$S	999.900$T	999.900$F	999.900$S	9.720 W	999.900$S	999.900$M	999.900$T	999.900$S
2	999.900$M	999.900$T	999.900$F	999.900$M	999.900$W	2.020 S	3.540 M	999.900$T	999.900$S	999.900$T	17.070 F	5.830 S
3	999.900$T	1.560 F	999.900$S	4.350 T	999.900$T	999.900$S	999.900$T	999.900$F	4.300 M	10.080 W	999.900$S	999.900$M
4	7.720 W	999.900$S	6.910 S	999.900$W	999.900$F	999.900$M	999.900$W	5.190 S	999.900$T	999.900$T	999.900$S	999.900$T
5	999.900$T	999.900$S	999.900$M	999.900$T	999.900$S	1.480 T	6.160 T	999.900$S	999.900$W	999.900$F	12.750 M	12.340 W
6	999.900$F	15.280 M	999.900$T	4.050 F	3.630 S	999.900$W	999.900$F	999.900$M	2.650 T	5.340 S	999.900$T	999.900$T
7	3.960 S	999.900$T	2.250 W	999.900$S	999.900$M	999.900$T	999.900$S	1.280 T	999.900$F	999.900$S	999.900$W	999.900$F
8	999.900$S	999.900$W	999.900$T	999.900$S	999.900$T	1.020 F	3.080 S	999.900$W	999.900$S	999.900$M	4.060 T	13.680 S
9	999.900$M	8.230 T	999.900$F	3.260 M	1.380 W	999.900$S	999.900$M	999.900$T	2.970 S	13.040 T	999.900$F	999.900$S
10	4.290 T	999.900$F	3.000 S	999.900$T	999.900$T	999.900$S	999.900$T	14.790 F	999.900$M	999.900$W	999.900$S	999.900$M
11	999.900$W	999.900$S	999.900$S	999.900$W	999.900$F	8.810 M	6.760 W	999.900$S	999.900$T	999.900$T	19.270 S	4.780 T
12	999.900$T	5.870 S	999.900$M	2.850 T	8.630 S	999.900$T	999.900$T	999.900$S	2.060 W	10.830 F	999.900$M	999.900$W
13	1.230 F	999.900$M	8.000 T	999.900$F	999.900$S	999.900$W	999.900$F	7.260 M	999.900$T	999.900$S	999.900$T	999.900$T
14	999.900$S	999.900$T	999.900$T	999.900$S	999.900$M	3.650 T	3.690 S	999.900$T	999.900$F	999.900$S	1.230 W	3.650 F
15	999.900$S	11.340 W	999.900$T	8.100 S	2.530 T	999.900$F	999.900$S	999.900$W	7.970 S	8.600 M	999.900$T	999.900$S
16	8.150 M	999.900$T	2.320 F	999.900$M	999.900$W	999.900$S	999.900$M	5.100 T	999.900$S	999.900$T	999.900$F	999.900$S
17	999.900$T	999.900$F	999.900$S	999.900$T	999.900$T	999.900$S	8.460 T	999.900$S	999.900$M	999.900$W	6.050 S	6.440 M
18	999.900$W	6.580 S	999.900$S	8.580 W	2.580 F	999.900$M	999.900$W	999.900$S	8.560 T	8.700 T	999.900$S	999.900$T
19	9.050 T	999.900$S	999.900$M	999.900$T	999.900$S	999.900$T	999.900$T	999.900$S	999.900$W	999.900$F	999.900$M	999.900$W
20	999.900$F	999.900$M	999.900$T	999.900$F	999.900$S	8.940 W	8.250 F	999.900$M	999.900$T	999.900$S	2.130 T	3.990 T
21	999.900$S	2.900 T	999.900$W	1.300 S	1.500 M	999.900$T	999.900$S	999.900$T	8.580 F	2.950 S	999.900$W	999.900$F
22	2.610 S	999.900$W	8.580 T	999.900$S	999.900$T	999.900$F	999.900$S	999.900$F	999.900$W	999.900$S	999.900$M	999.900$S
23	999.900$M	999.900$T	999.900$F	999.900$M	999.900$W	2.570 S	8.860 M	999.900$T	999.900$S	999.900$T	15.100 F	1.140 S
24	999.900$T	1.400 F	999.900$S	999.900$T	8.520 T	999.900$S	999.900$T	999.900$F	2.320 M	2.760 W	999.900$S	999.900$M
25	4.650 W	999.900$S	8.260 S	999.900$W	999.900$F	999.900$M	999.900$W	3.930 S	999.900$T	999.900$T	999.900$S	999.900$T
26	999.900$T	999.900$S	999.900$M	999.900$T	999.900$S	7.820 T	11.760 T	999.900$S	999.900$W	999.900$F	7.500 M	8.860 W
27	999.900$F	6.150 M	999.900$T	1.220 F	8.750 S	999.900$W	999.900$F	999.900$M	8.160 T	3.000 S	999.900$T	T
28	8.810 S	T	1.640 W	999.900$S	999.900$M	999.900$T	999.900$S	1.100 T	999.900$F	999.900$W	999.900$S	F
29	999.900$S	W	999.900$T	999.900$S	999.900$T	8.710 F	4.990 S	999.900$W	999.900$S	999.900$M	2.720 T	S
30	999.900$M	999.900$F	3.520 M	3.420 W	S	M	999.900$T	16.590 S	2.810 T	W	F	S
31	17.120 T	2.960 S		T	T	T	8.480 F	W				M
#		30			27			28			29	
MAX		17.120			9.100			16.590			19.270	
ARITH MEAN		5.772			2.741			5.616			6.829	

TOTAL SAMPLES = 115 MAXIMUM = 19.270
TOTAL PRIMARY EXCEEDANCES = 4

*** EACH QUARTERLY MEAN EXCEEDS PRIMARY STANDARD OF 1.500 MICROGRAMS PER CUBIC METER

$ INDICATES ITEM HAS TO BE MULTIPLIED BY 10 TO OBTAIN THE CORRECT VALUE. EXAMPLE: AN ITEM PRINTED AS 24.3$ WOULD = 243.0

Figure AP-11-H

STATE OF MONTANA - DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
POINT SOURCE MASTER DETAIL LIST — REPORT DATE: 03/04/85 — PAGE: 212

COUNTY: GALLATIN 0520 AQCR: HELENA 142 PLANT ID: 0001

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	CONTROL REGION	LOCAL CONTROL	USER PLANT ID	CITY	UTM ZONE	OWNER	CONTACT	TELEPHONE	PRINCIPAL PRODUCT	NUMBER OF EMPLOYEES
000	82	05/83					12	P	STEVE WALISER	4065873116	ASPHALT	0030

ESTABLISHMENT NAME AND ADDRESS	ZIP	MAILING ADDRESS	ZIP	PROPERTY AREA - ACRES
PIONEER READY MIX-OFF HIWAY 10. NW OF BZMAN		BOX 248. BOZEMAN. MONTANA	59715	00035.0

****

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	POINT ID NEDS	USER	SIC	IPP	UTM COORDINATES-KM HORIZ	VERT	LATITUDE DEG MIN SEC	LONGITUDE DEG MIN SEC	% ANNUAL THRUPUT DEC MAR	JUN SEP	NORMAL OPERATING HR/D	D/WK	WK/YR
101	82	03/84	01		1611		487.7	5067.1			00 15	45 40	06	5	12

BOILER CAPACITY MM BTU	% SPACE HEAT	STACK DATA HEIGHT FEET	DIAM FEET	TEMP DEG F	FLOW RATE CU FT/MIN	VELOCITY FT/MIN	NBR OF POINTS	PLUME HT FEET	COMPLIANCE STAT	SCHED YR MO	STAT DATE	ECAP	CONTROL REG1	REG2	REGULATION REG3
		0020	10.0	0150	0045000	00072			1			0	1401	1402	1411

NBR OF POLLUTS	POLLUTANT ID	CONTROL CUST THOUS $$	CNTL EQUIP PRI	CNTL EQUIP SEC	% ESTIM CONTROL EFFICIENCY	EMISSIONS TONS/YEAR UNCONTROLLED	EMISSIONS TONS/YEAR ESTIMATED ALLOWABLE	ESTIM METH	TEST METH	EMISS UNITS
05	SUSPENDED PARTICULATE		007		99.0	0001035	0000010	3		
	CARBON MONOXIDE		000		00.0	0000001	0000001	3		
	SULFUR DIOXIDE		000		00.0	0000002	0000002	3		
	NITROGEN DIOXIDE		000		00.0	0000001	0000001	3		
	VOLATILE ORGANIC COMP		000		00.0	0000002	0000002	3		

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	SCC I	II	III	IV	FUEL PROCESS RATE	MAX DESIGN RATE-HOURLY	% SULFUR CONTENT	% ASH CONTENT	HEAT CONTENT MM BTU	CONFID CODE	SOURCE CODE	BEC NBR	ID	FUEL UNITS
2 01 05	82	03/84	3	05	002	01	0046000	0200.000				2	P			

SOURCE DESCRIPTION	EMIS FACTOR SOURCE	NBR OF EMIS FACTORS	POLLUTANT ID	EMISSION FACTOR	ASH/SULPHUR CODE	FACTOR UNITS
ASPHALT PRODUCTION	A	05	CARBON MONOXIDE	000000.030		
			SUSPENDED PARTICULATE	000045.000		
			VOLATILE ORGANIC COMP	000000.080		
			NITROGEN DIOXIDE	000000.030		
			SULFUR DIOXIDE	000000.070		

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	SCC I	II	III	IV	FUEL PROCESS RATE	MAX DESIGN RATE-HOURLY	% SULFUR CONTENT	% ASH CONTENT	HEAT CONTENT MM BTU	CONFID CODE	SOURCE CODE	BEC NBR	ID	FUEL UNITS
2 01 10	82	03/84	3	90	005	01	0000662	0000.400	0.40		00150	2	C			

SOURCE DESCRIPTION	EMIS FACTOR SOURCE	NBR OF EMIS FACTORS	POLLUTANT ID	EMISSION FACTOR	ASH/SULPHUR CODE	FACTOR UNITS
FUEL OIL-#2	A	01	SUSPENDED PARTICULATE	000000.000		

Figure AP-12-H

STATE OF MONTANA - DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
POINT SOURCE MASTER DETAIL LIST REPORT DATE: 03/04/85 PAGE: 335

COUNTY: LINCOLN 0940 AQCR: MISSOULA 144 PLANT ID: 0002

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	CONTROL REGION	LOCAL CONTROL	USER PLANT ID	CITY	UTM ZONE	OWNER	CONTACT	TELEPHONE	PRINCIPAL PRODUCT	NUMBER OF EMPLOYEES
000	83	07/84					11	P	DICK WEBB	4066824436	STUDS	0090

ESTABLISHMENT NAME AND ADDRESS	ZIP	MAILING ADDRESS	ZIP	PROPERTY AREA - ACRES
PLUM CRK-KSANKA LUMBER, S.OF FORTINE,US 93		PO BOX 28	59918	00060.0

****

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	POINT ID NEDS USER	SIC	IPP	UTM COORDINATES-KM HORIZ	UTM COORDINATES-KM VERT	LATITUDE DEG MIN SEC	LONGITUDE DEG MIN SEC	% ANNUAL THRUPUT DEC MAR	% ANNUAL THRUPUT JUN SEP	NORMAL OPERATING HR/D	NORMAL OPERATING D/WK	NORMAL OPERATING WK/YR
101	83	07/84	01	2421		655.3	5402.7			25 25	25 25	16	5	51

BOILER CAPACITY MM BTU	% SPACE HEAT	STACK DATA HEIGHT FEET	STACK DATA DIAM FEET	STACK DATA TEMP DEG F	STACK DATA FLOW RATE CU FT/MIN	STACK DATA VELOCITY FT/MIN	STACK DATA NBR OF POINTS	STACK DATA PLUME HT FEET	COMPLIANCE STAT	COMPLIANCE SCHED YR MO	COMPLIANCE STAT DATE	ECAP CONTROL REG1	REGULATION REG2	REGULATION REG3
		0060	20.0	0400	0026131	00083			1			0	1407	

NBR OF POLLUTS	POLLUTANT ID	CONTROL COST THOUS $$	CNTL EQUIP PRI	CNTL EQUIP SEC	% ESTIM CONTROL EFFICIENCY	EMISSIONS TONS/YEAR UNCONTROLLED	EMISSIONS TONS/YEAR ESTIMATED ALLOWABLE	ESTIM METH	TEST METH	EMISS UNITS
05	SUSPENDED PARTICULATE		000		00.0	0000048	0000048	3		
	CARBON MONOXIDE		000		00.0	0000883	0000883	3		
	SULFUR DIOXIDE		000		00.0	0000001	0000001	3		
	NITROGEN DIOXIDE		000		00.0	0000007	0000007	3		
	VOLATILE ORGANIC COMP		000		00.0	0000075	0000075	3		

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	SCC I II III IV	FUEL PROCESS RATE	MAX DESIGN RATE-HOURLY	% SULFUR CONTENT	% ASH CONTENT	HEAT CONTENT MM BTU	CONFID CODE	SOURCE CODE	BEC NBR	FUEL ID	UNITS
2 01 05	83	07/84	5 03 001 05	0013592	0008.900	0.00	0.50	00007	2	S			

SOURCE DESCRIPTION	EMIS FACTOR SOURCE	NBR OF EMIS FACTORS	POLLUTANT ID	EMISSION FACTOR	ASH/SULPHUR CODE	FACTOR UNITS
WOOD WASTE BURNER	A	05	SUSPENDED PARTICULATE	000007.000		
			VOLATILE ORGANIC COMP	000011.000		
			NITROGEN DIOXIDE	000001.000		
			SULFUR DIOXIDE	000000.100		
			CARBON MONOXIDE	000130.000		

****

Figure AP-13-H

STATE OF MONTANA - DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
POINT SOURCE MASTER DETAIL LIST REPORT DATE: 03/04/85 PAGE: 471

COUNTY: RICHLAND 1320 AQCR: MILES CITY 143 PLANT ID: 0001

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	CONTROL REGION	LOCAL CONTROL	USER PLANT ID	CITY	UTM ZONE	OWNER	CONTACT	TELEPHONE	PRINCIPAL PRODUCT	NUMBER OF EMPLOYEES
000	83	10/84				1460	13	P	EUGENE SATTLER	4064824000	GAS	0015

ESTABLISHMENT NAME AND ADDRESS	ZIP	MAILING ADDRESS	ZIP	PROPERTY AREA - ACRES
UTEX STATELINE GASPLANT		PO BOX 506, SIDNEY, MONTANA	59270	00033.0

****

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	POINT ID NEDS USER	SIC	IPP	UTM COORDINATES-KM HORIZ	UTM COORDINATES-KM VERT	LATITUDE DEG MIN SEC	LONGITUDE DEG MIN SEC	% ANNUAL THRUPUT DEC MAR	% ANNUAL THRUPUT JUN SEP	NORMAL OPERATING HR/D	NORMAL OPERATING D/WK	NORMAL OPERATING WK/YR
101	83	10/84	01	1311		507.0	5279.9			25 25	25 25	24	7	52

BOILER CAPACITY MM BTU	% SPACE HEAT	STACK DATA HEIGHT FEET	STACK DATA DIAM FEET	STACK DATA TEMP DEG F	STACK DATA FLOW RATE CU FT/MIN	STACK DATA VELOCITY FT/MIN	NBR OF POINTS	PLUME HT FEET	COMPLIANCE STAT	COMPLIANCE SCHED YR MO	COMPLIANCE STAT DATE	ECAP	CONTROL REGI	REGULATION REG2	REG3
		0200	01.0	0480	0000131	00166			1			0	1411		

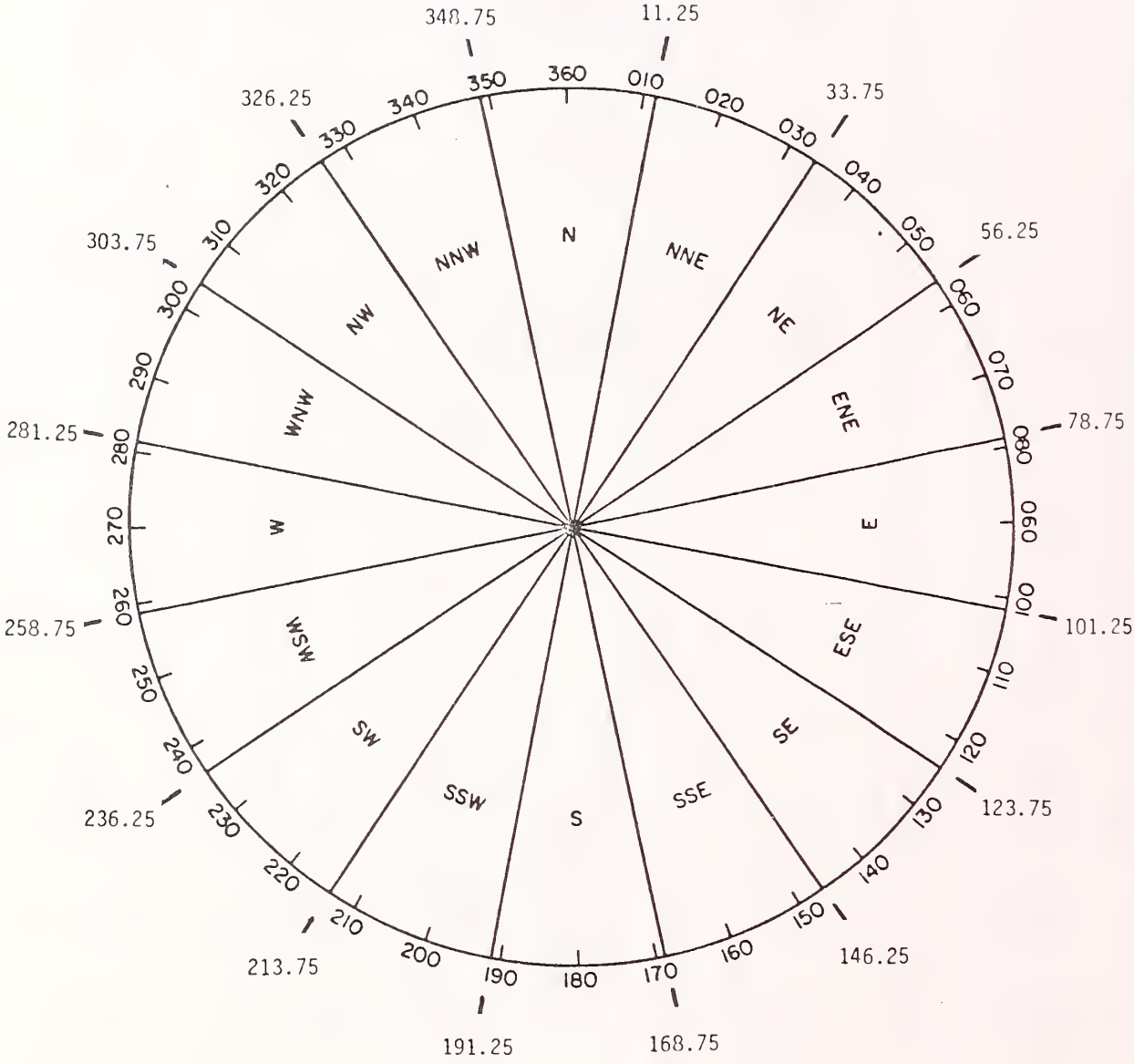
NBR OF POLLUTANTS	POLLUTANT ID	CONTROL COST THOUS $$	CNTL EQUIP PRI	CNTL EQUIP SEC	% ESTIM CONTROL EFFICIENCY	EMISSIONS TONS/YEAR UNCONTROLLED	EMISSIONS TONS/YEAR ESTIMATED	EMISSIONS TONS/YEAR ALLOWABLE	ESTIM METH	TEST METH	EMISS UNITS
05	SUSPENDED PARTICULATE		000		00.0		0000000		2		
	CARBON MONOXIDE		000		00.0		0004608		2		
	SULFUR DIOXIDE		000		00.0		0001186		2		
	NITROGEN DIOXIDE		000		00.0		0002525		2		
	VOLATILE ORGANIC COMP		000		00.0		0000000		2		

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	SCC I II III IV	FUEL PROCESS RATE	MAX DESIGN RATE-HOURLY	% SULFUR CONTENT	% ASH CONTENT	HEAT CONTENT MM BTU	CONFID CODE	SOURCE CODE	BEC NBR ID	FUEL UNITS
2 01 05	83	10/84	3 06 009 99	0001825		0.77			2	C		

SOURCE DESCRIPTION	EMIS FACTOR SOURCE	NBR OF EMIS FACTORS	POLLUTANT ID	EMISSION FACTOR	ASH/SULPHUR CODE	FACTOR UNITS
FLARE STACK		01				

SEGMENT ID	YEAR OF RECORD	LAST UPDATE	LINE NBR	* * * * COMMENTS * * * *
3 01 11	83	10/84	001	SHELL HAS A PERMIT LIMITATION OF 8500 POUNDS PER DAY OF SO2. THEREFORE, AN ALLOWABLE LIMIT OF 1551
3 01 11	83	10/84	002	TONS PER YEAR SO2.

Figure AP-14-H


348.75
11.25
326.25
33.75
303.75
56.25
281.25
78.75
258.75
101.25
236.25
123.75
213.75
146.25
191.25
168.75
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
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050
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070
080
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APPENDIX I

Air Quality Data Plots

APPENDIX I

AIR QUALITY DATA PLOTS

This appendix shows a sampling of plots and histograms that can be generated using air quality data.

The list is as follows:

TSP - One Year Plots

AP-1-I Anaconda - Lincoln School - 1983
AP-2-I Helena - Capital Courts - 1983
AP-3-I Kalispell - Courthouse East - 1984
AP-4-I Libby - Lincoln County Courthouse - 1984
AP-5-I Missoula - Boyd Park - 1984

TSP - Three Year Plots

AP-6-I Bozeman - Whittier School - 1982-84
AP-7-I Libby - Brown Residence - 1982-84
AP-8-I Missoula - Rose Park - 1982-84

Carbon Monoxide - Diurnal

AP-9-I Great Falls - Great Falls Federal - January 1983
AP-10-I Missoula - Boyd Park - January 1983

Sulfur Dioxide - Diurnal

AP-11-I Billings - North Johnson Lane - September 1984
AP-12-I Billings - Lockwood Park - September 1984

Lead - One Year Plots

AP-13-I East Helena - Hastie Residence - 1983
AP-14-I East Helena - Firehall - 1984

Lead - Three Year Plots

AP-15-I East Helena - Hastie Residence - 1982-84
AP-16-I East Helena - Hadfield - 1982-84

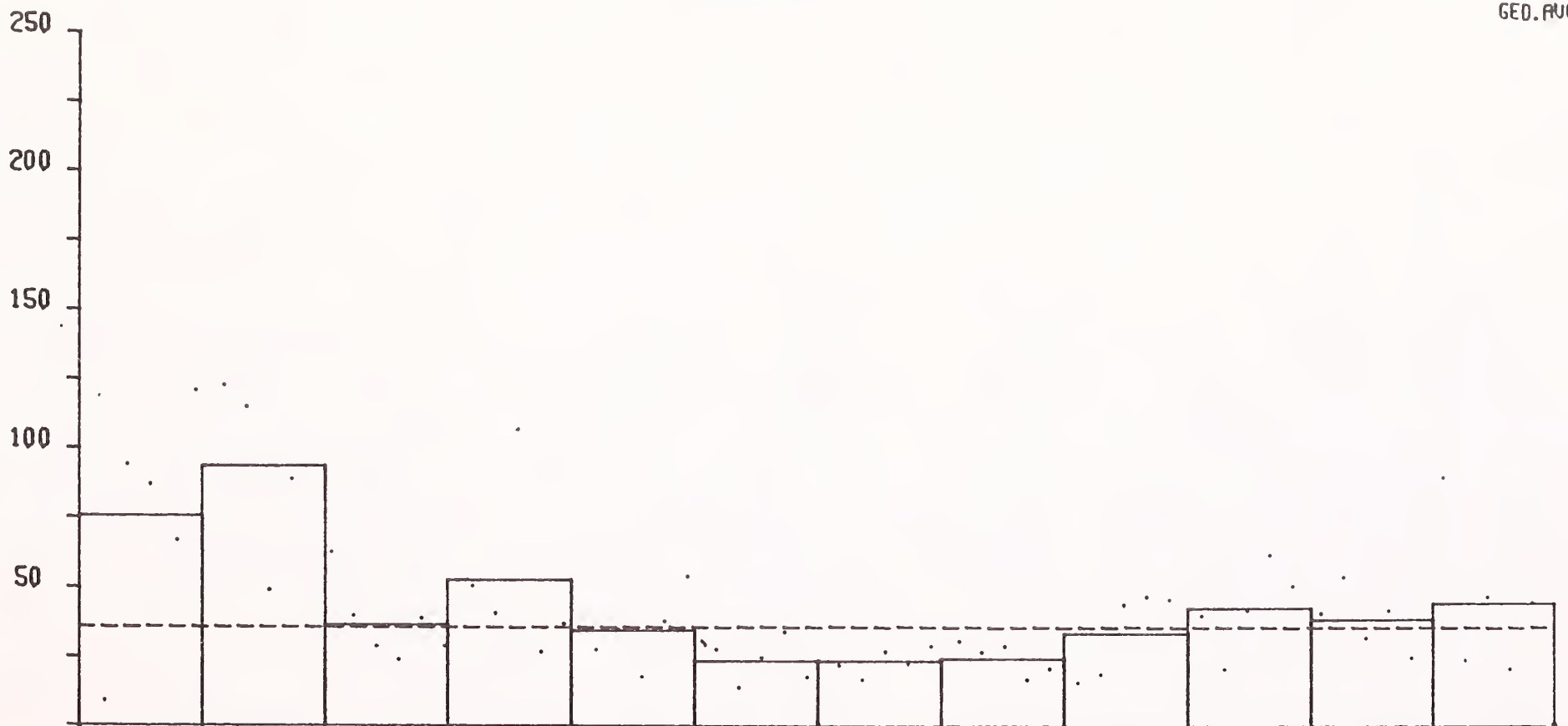
Beta (Light) Scatter - Diurnal

AP-17-I Libby - Wrecking Yard - February 1984

Figure AP-1-I

1983

GEO.AVG = 36



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUM-OBS	5	4	6	5	5	5	5	5	5	5	5	5
1-HIGH	121	123	63	107	54	34	29	31	47	62	54	90
2-HIGH	94	115	40	51	38	28	27	29	46	51	42	47
NO.AVG	76	94	37	53	35	24	24	25	34	43	39	45

PLOT. . . . . CONCENTRATION VERSUS TIME

METHOD . . . . . HI VOL

UNITS . . . . . MICROGRAMS/CUBIC METER

STANDARDS . . . (FEDERAL) ANNUAL - 75 UG/CU.M

PARAMETER . . TOTAL SUSPENDED PARTICULATES

AREA. . . . . 0020, DEER LODGE COUNTY

SITE. . . . . 007, LINCOLN SCHOOL

CITY. . . . . ANACONDA

MONTANA STATE AIR QUALITY BUREAU

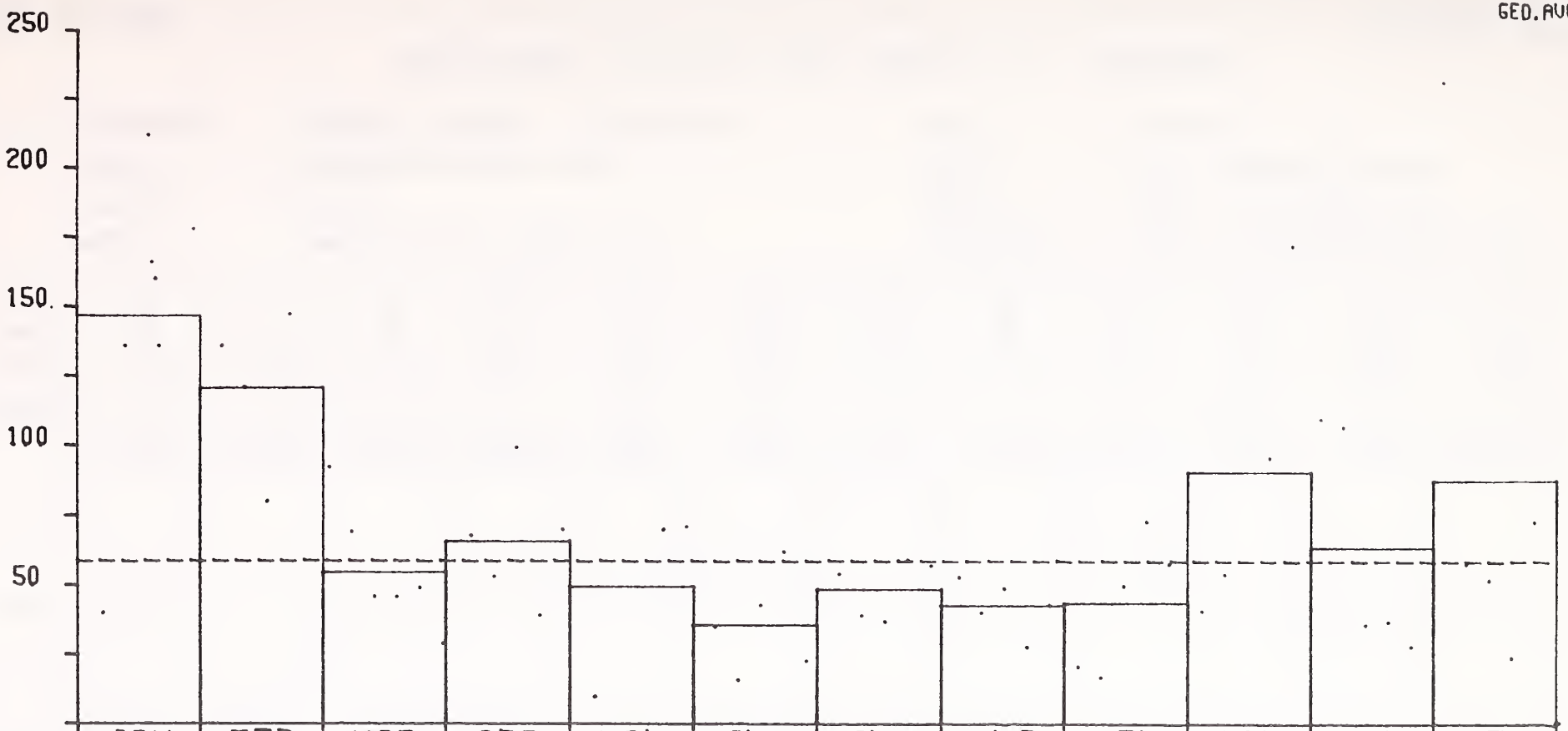
MARCH 27, 1985

TECHNICAL SERVICES

Figure AP-2-I

1983

GEO.AVG = 59



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUM-OBS	7	4	6	5	3	5	5	5	5	4	5	5
1-HIGH	212	147	92	99	71	62	59	53	73	172	110	232
2-HIGH	178	136	69	70	70	43	57	49	58	96	107	73
MO.AVG	147	121	55	66	50	36	49	43	44	91	64	88

PLOT. . . . . CONCENTRATION VERSUS TIME

METHOD . . . . . HI VOL

UNITS . . . . . MICROGRAMS/CUBIC METER

STANDARDS . . . (FEDERAL) ANNUAL - 75 UG/CU.M

PARAMETER . . TOTAL SUSPENDED PARTICULATES

AREA. . . . . 0720, LEWIS & CLARK COUNTY

SITE. . . . . 013, CAPITAL COURTS

CITY. . . . . HELENA

MONTANA STATE AIR QUALITY BUREAU

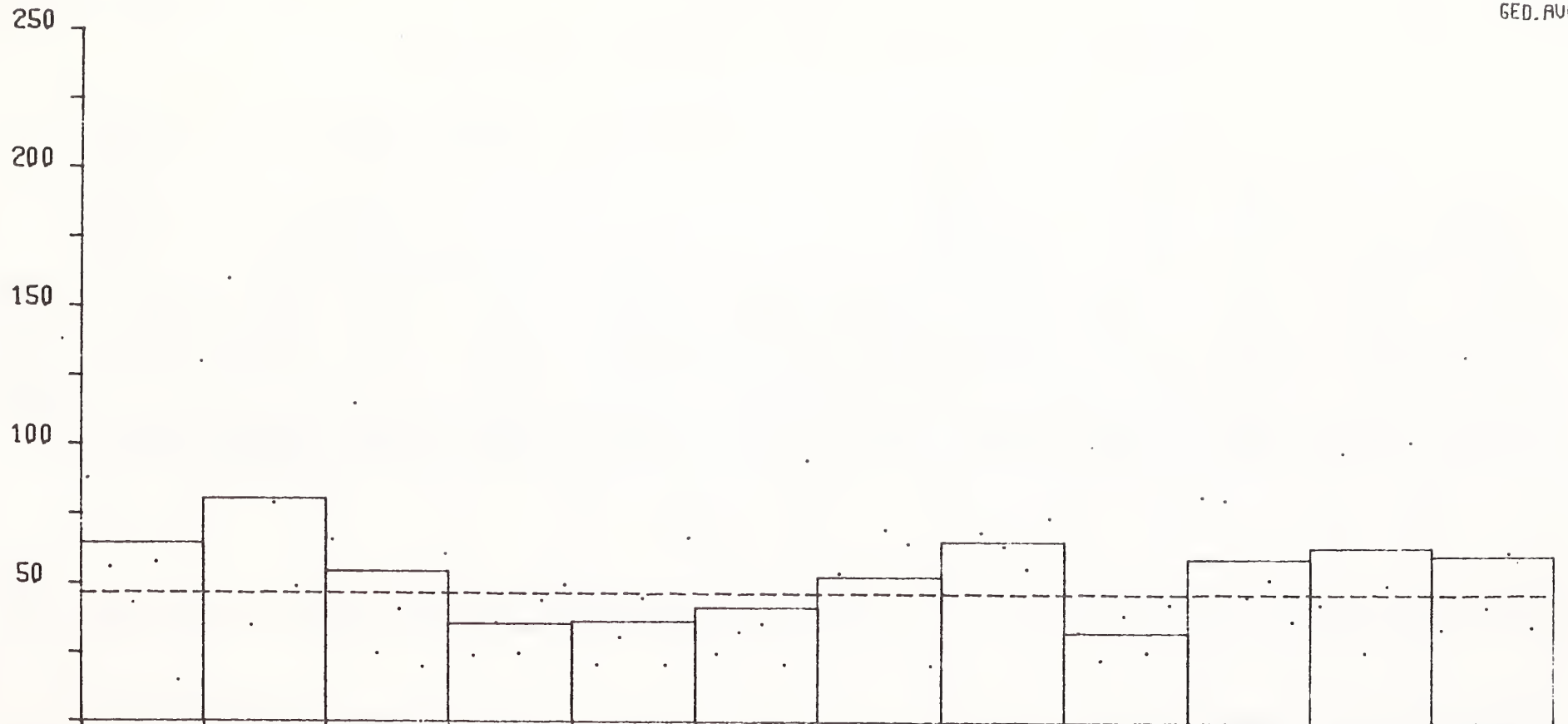
MARCH 27, 1985

TECHNICAL SERVICES

Figure AP-3-I

1984

GED.AVG = 47



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUM-OBS	6	4	6	5	5	5	4	4	5	5	5	5
1-HIGH	130	160	115	50	67	95	70	74	43	82	102	133
2-HIGH	88	79	66	44	45	36	65	69	39	81	98	62
MO.AVG	65	81	55	36	37	42	53	66	33	60	64	61

PLOT. . . . . CONCENTRATION VERSUS TIME

METHOD . . . . . HI VOL

UNITS . . . . . MICROGRAMS/CUBIC METER

STANDARDS . . . (FEDERAL) ANNUAL - 75 UG/CU.M

PARAMETER . . TOTAL SUSPENDED PARTICULATES

AREA. . . . . 0800, FLATHEAD COUNTY

SITE. . . . . 017, COURTHOUSE EAST

CITY. . . . . KALISPELL

MONTANA STATE AIR QUALITY BUREAU

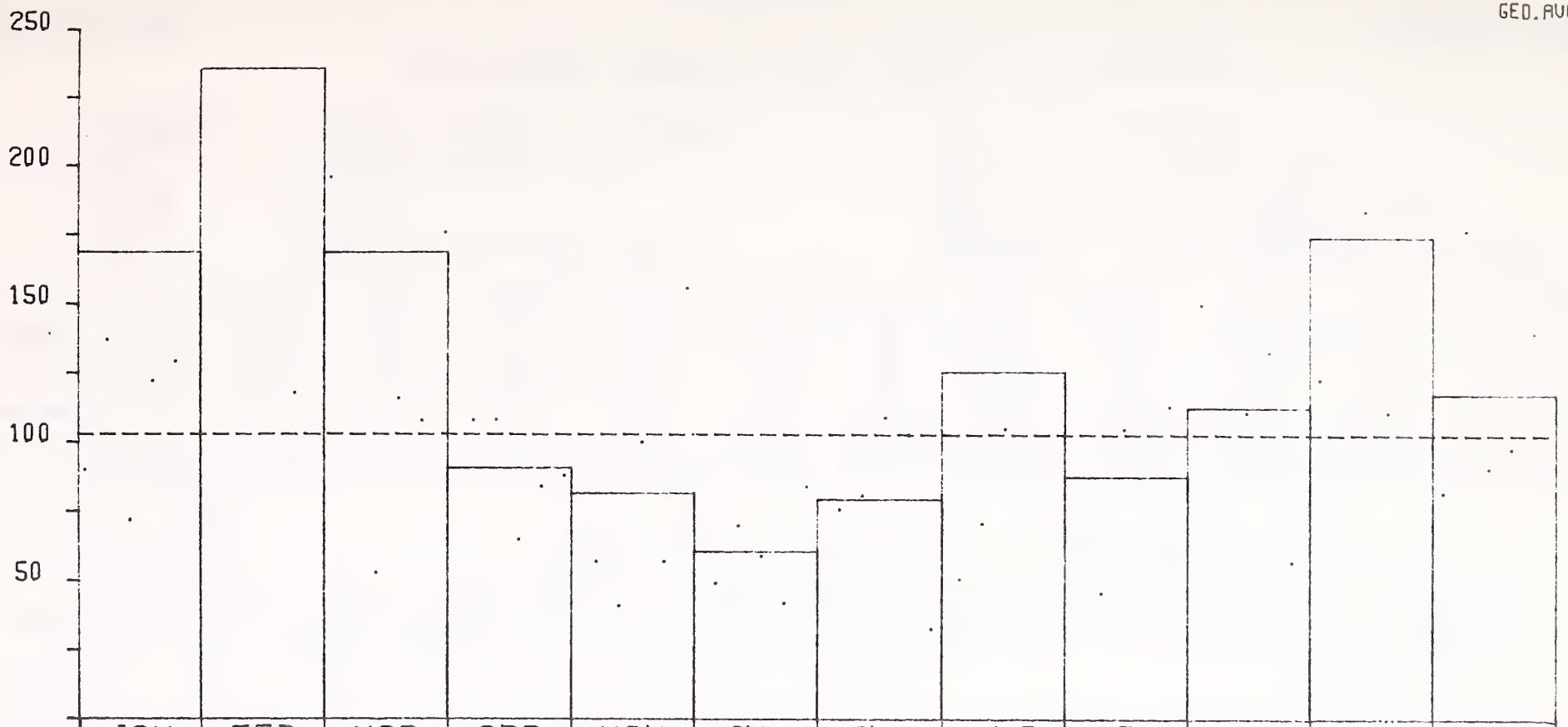
JUNE 19, 1985

TECHNICAL SERVICES

Figure AP-4-I

1984

GEO.AVG = 103



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUM-OBS	6	2	6	5	5	5	5	4	3	4	4	5
1-HIGH	463	354	364	108	156	84	109	277	113	150	281	177
2-HIGH	137	118	196	108	100	70	103	105	105	133	184	140
MO.AVG	169	236	169	91	82	61	80	126	88	113	175	118

PLOT. . . . . CONCENTRATION VERSUS TIME

METHOD . . . . . HI VOL

UNITS . . . . . MICROGRAMS/CUBIC METER

STANDARDS . . . (FEDERAL) ANNUAL - 75 UG/CU.M

PARAMETER . . TOTAL SUSPENDED PARTICULATES

AREA. . . . . 0900, LINCOLN COUNTY

SITE. . . . . 012, COURTHOUSE

CITY. . . . . LIBBY

MONTANA STATE AIR QUALITY BUREAU

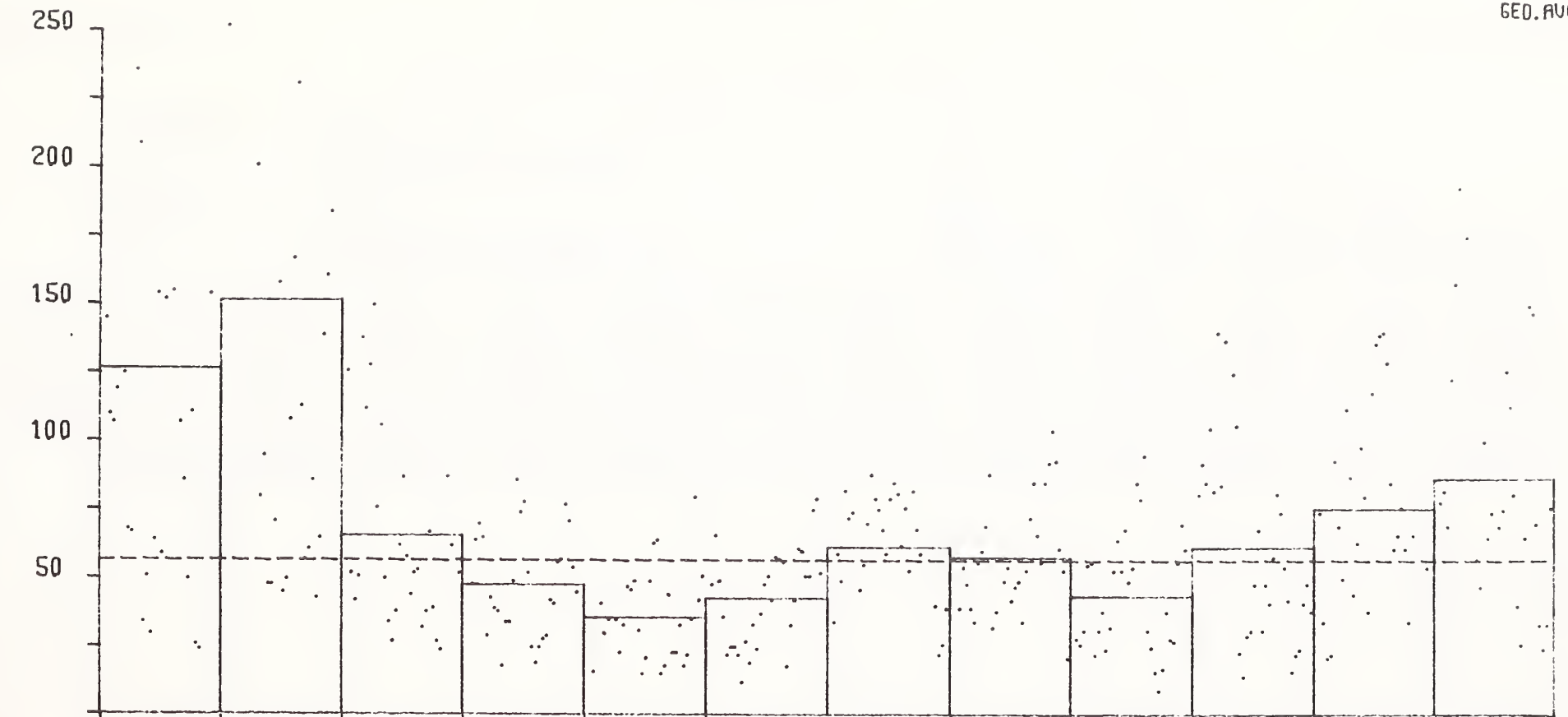
JUNE 19, 1985

TECHNICAL SERVICES

Figure AP-5-I

1984

GEO.AVG = 57



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUM-OBS	26	28	29	29	28	30	27	30	30	30	27	27
1-HIGH	440	343	150	86	80	79	88	104	95	140	140	193
2-HIGH	408	314	138	78	64	75	85	93	85	137	139	175
MO.AVG	127	152	66	48	36	43	62	58	44	62	76	87

PLOT. . . . . CONCENTRATION VERSUS TIME

METHOD . . . . . HI VOL

UNITS . . . . . MICROGRAMS/CUBIC METER

STANDARDS . . . (FEDERAL) ANNUAL - 75 UG/CU.M

PARAMETER . . TOTAL SUSPENDED PARTICULATES

AREA. . . . . 1100, MISSOULA COUNTY

SITE. . . . . 024, BOYD PARK

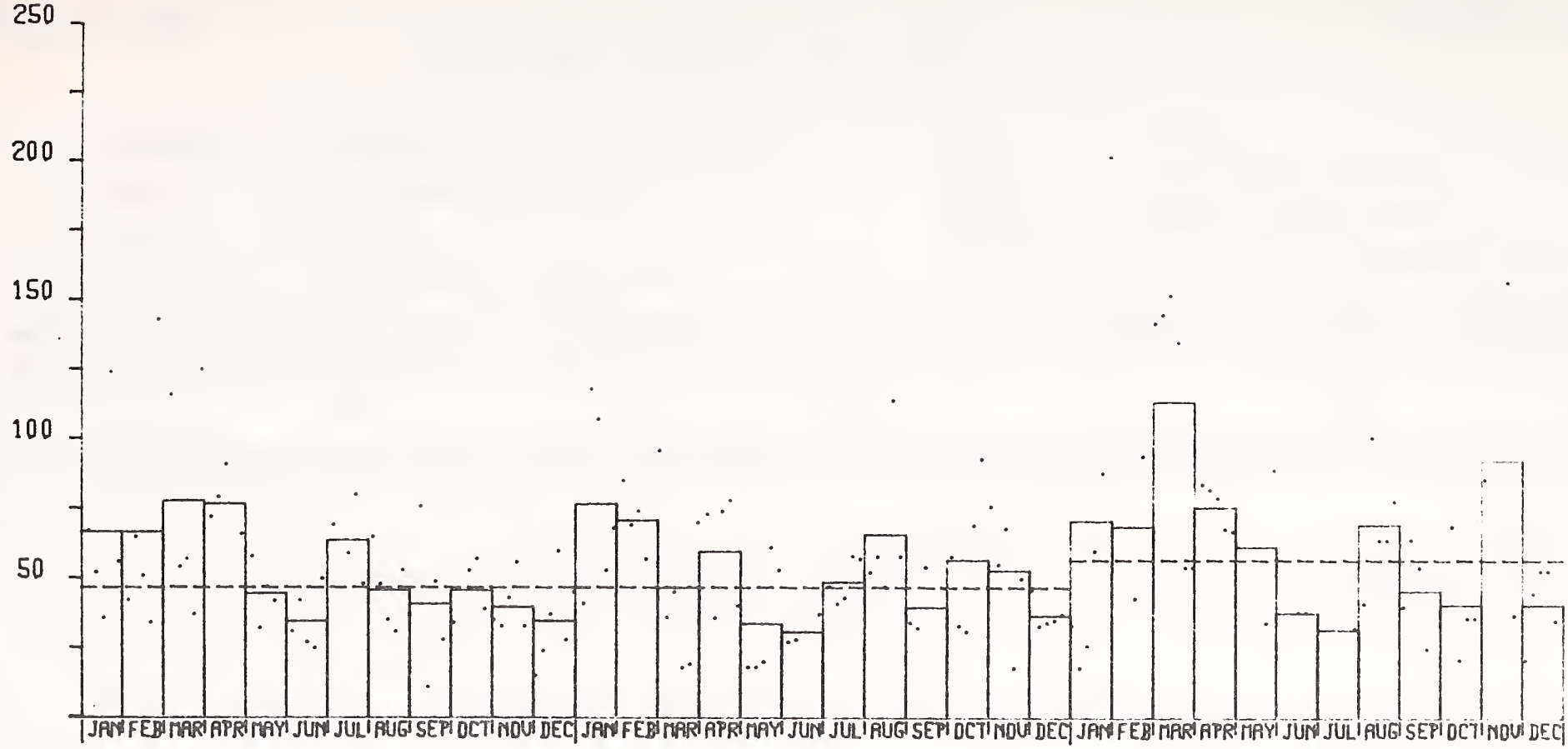
CITY. . . . . MISSOULA

MONTANA STATE AIR QUALITY BUREAU

JUNE 20, 1985

TECHNICAL SERVICES

Figure AP-6-I



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUM OBS	5	5	5	4	4	5	4	5	4	4	5	6	5	4	6	5	5	3	5	5	3	5	5	5	6	2	6	5	2	2	1	5	4	4	3	5
MO.AVG	67	67	78	77	45	35	64	46	41	46	40	35	77	71	47	60	34	31	49	66	40	57	53	37	71	69	114	76	62	38	32	70	46	41	93	41
GEO.AVG	47												47												57											

PLOT. . . . . CONCENTRATION VERSUS TIME
METHOD . . . . . HI VOL
UNITS . . . . . MICROGRAMS/CUBIC METER
STANDARDS . . . (FEDERAL) ANNUAL - 75 UG/CU.M

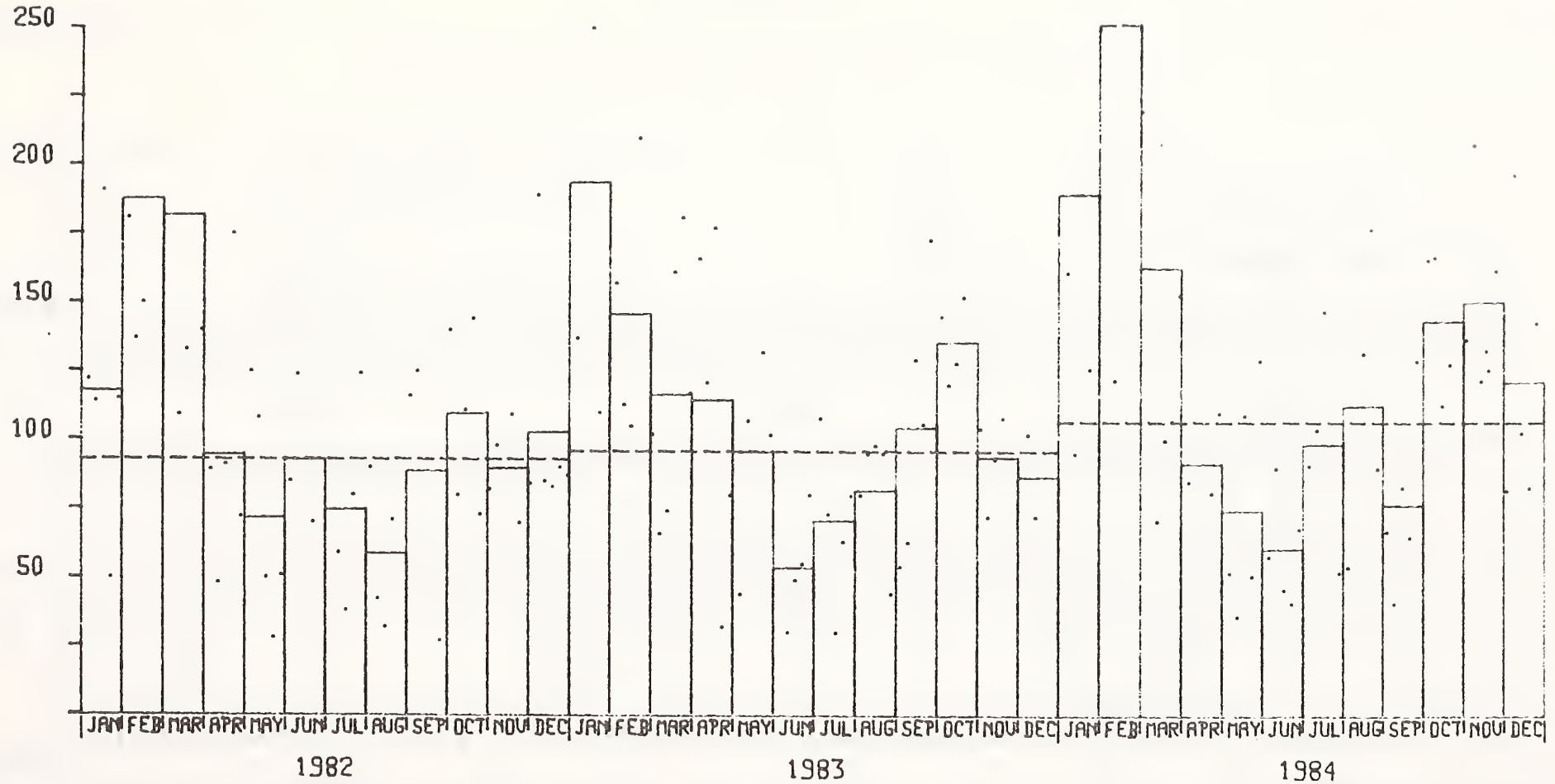
PARAMETER . . TOTAL SUSPENDED PARTICULATES
AREA. . . . . 0120, GALLATIN COUNTY
SITE. . . . . 005, WHITTIER SCHOOL
CITY. . . . . BOZEMAN

MONTANA STATE AIR QUALITY BUREAU

JUNE 20, 1985

TECHNICAL SERVICES

Figure AP-7-I



NUM OBS	5	4	4	5	5	3	4	4	3	5	4	6	4	4	6	5	4	4	5	5	5	4	4	2	4	3	6	3	5	5	4	4	5	4	5	5
MO.AVG	118	188	182	95	72	93	75	59	89	110	90	103	194	146	117	115	96	54	71	82	105	136	94	87	190	252	163	92	75	61	99	113	77	144	151	122
GEO.AVG	93												96												107											

PLOT. . . . . CONCENTRATION VERSUS TIME
METHOD . . . . . HI VOL
UNITS . . . . . MICROGRAMS/CUBIC METER
STANDARDS . . . (FEDERAL) ANNUAL - 75 UG/CU.M

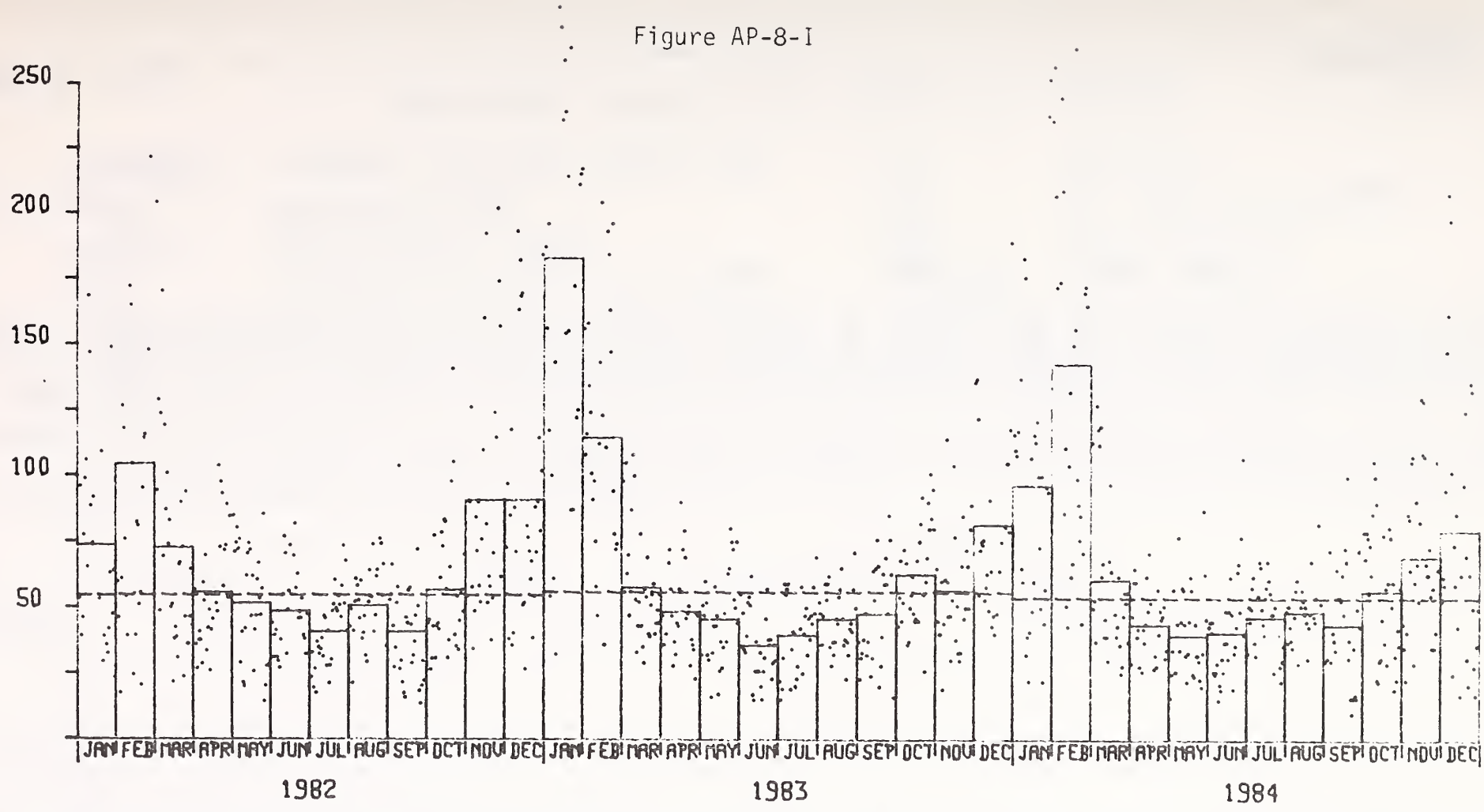
PARAMETER . . TOTAL SUSPENDED PARTICULATES
AREA. . . . . 0900, LINCOLN COUNTY
SITE. . . . . 010, BROWN RESIDENCE
CITY. . . . . LIBBY

MONTANA STATE AIR QUALITY BUREAU

JUNE 20, 1985

TECHNICAL SERVICES

Figure AP-8-I



NUM OBS	25	27	31	28	31	28	31	29	30	31	29	31	28	28	31	28	29	30	29	30	28	30	30	26	30	28	29	27	31	30	29	25	27	31	30	29
MO.AVG	74	105	73	56	52	49	41	51	41	57	91	91	183	115	58	49	46	36	40	46	48	63	57	82	97	143	61	44	40	41	47	49	44	57	70	80
GEO.AVG	55												56												54											

PLOT. . . . . CONCENTRATION VERSUS TIME
METHOD . . . . . HI VOL
UNITS . . . . . MICROGRAMS/CUBIC METER
STANDARDS . . . (FEDERAL) ANNUAL - 75 UG/CU.M

PARAMETER . . TOTAL SUSPENDED PARTICULATES
AREA. . . . . 1100, MISSOULA COUNTY
SITE. . . . . 020, ROSE PARK
CITY. . . . . MISSOULA

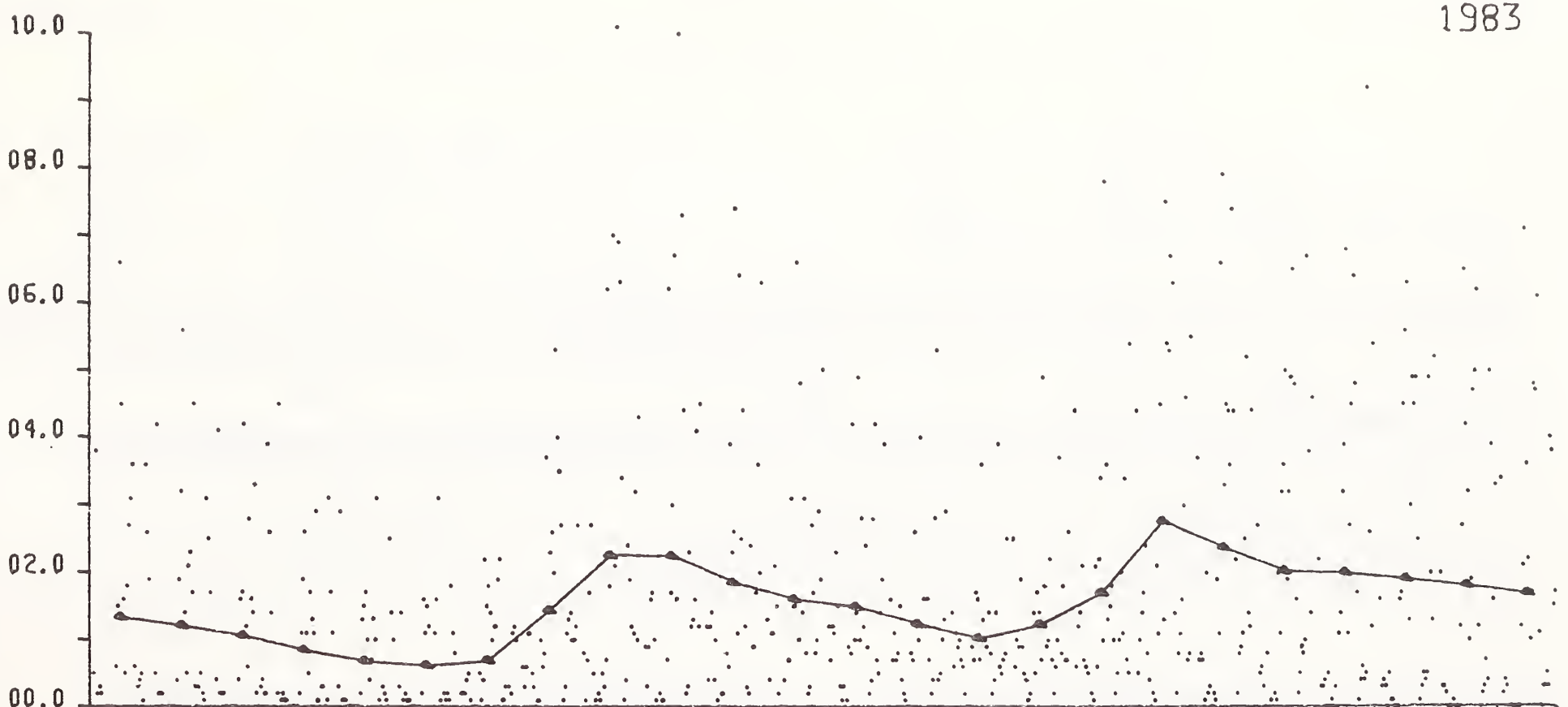
MONTANA STATE AIR QUALITY BUREAU

JUNE 25, 1985

TECHNICAL SERVICES

Figure AP-9-I

JANUARY
1983



	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
NUM-OBS	31	31	31	31	31	31	31	31	31	29	31	31	31	31	31	31	31	31	31	31	31	31	31	31
1-HIGH	6.60	5.60	4.20	4.50	3.10	3.10	2.20	5.30	10.1	10.0	7.40	6.60	4.90	5.30	3.90	4.90	7.80	13.0	7.90	6.70	9.20	6.30	6.50	7.10
2-HIGH	4.50	4.50	4.10	3.10	2.90	1.80	2.20	4.00	7.00	7.30	6.40	5.00	4.20	4.00	3.60	3.70	5.40	7.50	7.40	6.50	6.80	5.60	6.20	6.10
HR.AVG	1.33	1.21	1.06	.848	.687	.619	.697	1.44	2.26	2.24	1.85	1.60	1.49	1.24	1.03	1.23	1.70	2.76	2.38	2.03	2.00	1.91	1.81	1.68

PLOT. . . . . CONCENTRATION VERSUS TIME (MON-SUN)
METHOD . . . . . NON-DISPERSIVE INFARED
UNITS . . . . . PARTS PER MILLION
STANDARDS . . . (FEDERAL) 9 PPM 8-HR / 35 PPM 1-HR

PARAMETER . . CARBON MONOXIDE
AREA. . . . . 0660, GREAT FALLS
SITE. . . . . 021, GREAT FALLS FEDERAL
CITY. . . . . GREAT FALLS

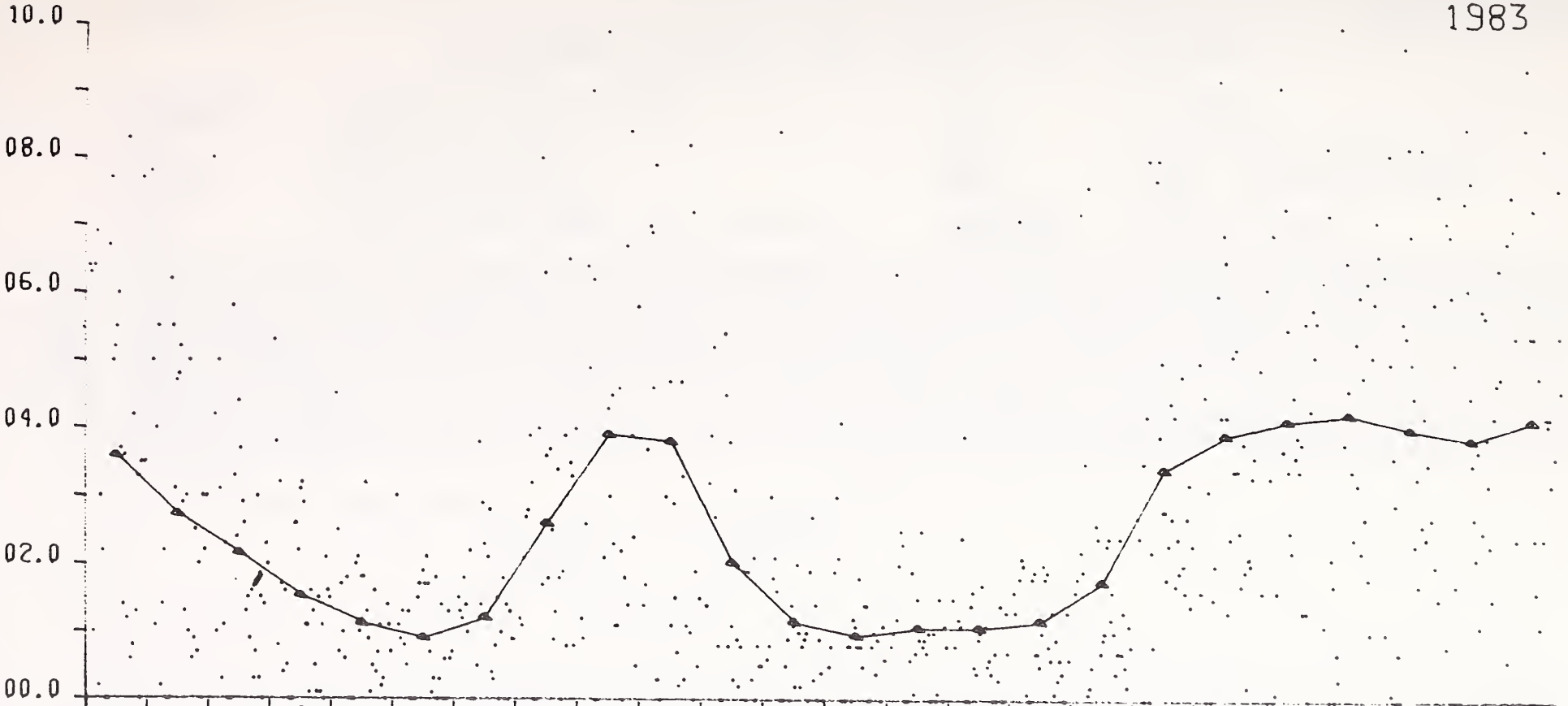
MONTANA STATE AIR QUALITY BUREAU

MARCH 28, 1985

TECHNICAL SERVICES

Figure AP-10-I

JANUARY
1983



	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
NUM-OBS	31	31	31	31	31	31	31	31	31	31	29	31	29	30	30	30	29	31	31	31	31	30	31	31
1-HIGH	8.30	7.80	8.00	5.30	4.50	3.00	3.80	8.00	13.1	15.1	11.4	8.40	4.10	6.30	7.00	7.10	7.60	12.3	13.2	11.3	11.1	9.70	8.50	9.40
2-HIGH	7.70	6.20	5.80	3.80	3.20	2.10	2.90	6.50	11.1	14.5	5.40	3.00	3.00	2.50	3.90	2.10	7.20	8.00	11.8	10.6	10.0	8.20	7.70	8.50
HR.AVG	3.60	2.73	2.15	1.53	1.12	.910	1.21	2.60	3.91	3.81	2.03	1.15	.959	1.07	1.08	1.17	1.75	3.41	3.92	4.13	4.23	4.02	3.86	4.16

PLOT. . . . . CONCENTRATION VERSUS TIME (MON-SUN)
METHOD . . . . . NON-DISPERSIVE INFARED
UNITS . . . . . PARTS PER MILLION
STANDARDS . . . (FEDERAL) 9 PPM 8-HR / 35 PPM 1-HR

PARAMETER . . CARBON MONOXIDE
AREA. . . . . 1100, MISSOULA
SITE. . . . . 024, BOYD PARK
CITY. . . . . MISSOULA

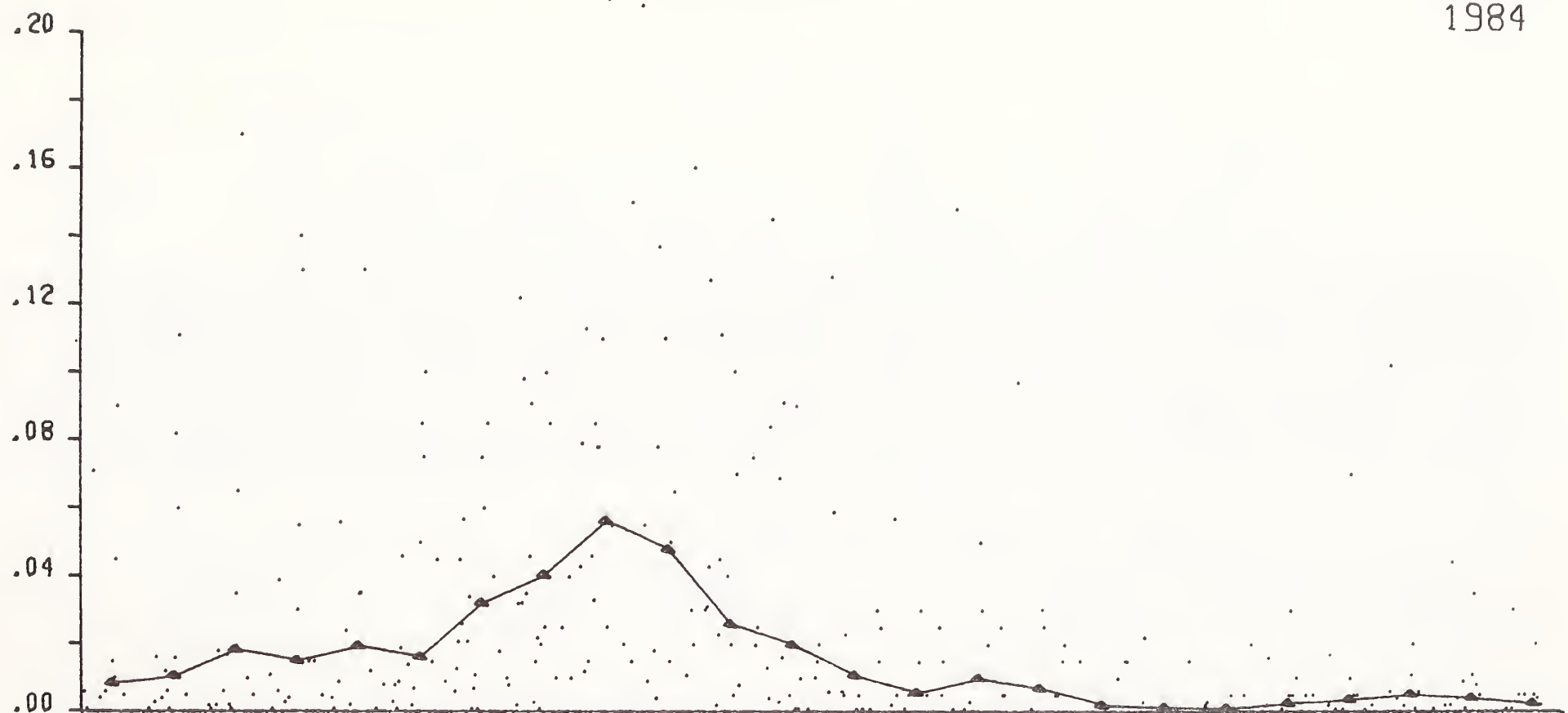
MONTANA STATE AIR QUALITY BUREAU

APRIL 4, 1985

TECHNICAL SERVICES

Figure AP-11-I

SEPTEMBER
1984



	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
NUM-OBS	30	30	30	30	30	30	30	30	30	30	30	30	29	30	29	28	27	29	29	29	30	30	30	30
1-HIGH	.090	.111	.220	.140	.270	.100	.425	.400	.520	.255	.127	.145	.128	.057	.148	.097	.015	.022	.020	.030	.070	.102	.044	.030
2-HIGH	.071	.082	.170	.130	.130	.085	.085	.122	.210	.215	.111	.091	.059	.030	.050	.030	.015	.015	.005	.016	.017	.020	.035	.020
HR.AVG	.008	.011	.018	.015	.020	.016	.032	.040	.056	.048	.026	.020	.011	.006	.010	.007	.002	.001	.001	.003	.004	.005	.004	.002

PLOT. . . . . CONCENTRATION VERSUS TIME (MON-SUN)
METHOD . . . . . PULSED FLUORESCENT
UNITS . . . . . PARTS PER MILLION
STANDARDS . . . (STATE) .50 PPM 1-HR AVG

PARAMETER . . SULFUR DIOXIDE
AREA. . . . . 0080, YELLOWSTONE COUNTY
SITE. . . . . 064, NORTH JOHNSON LANE
CITY. . . . . BILLINGS

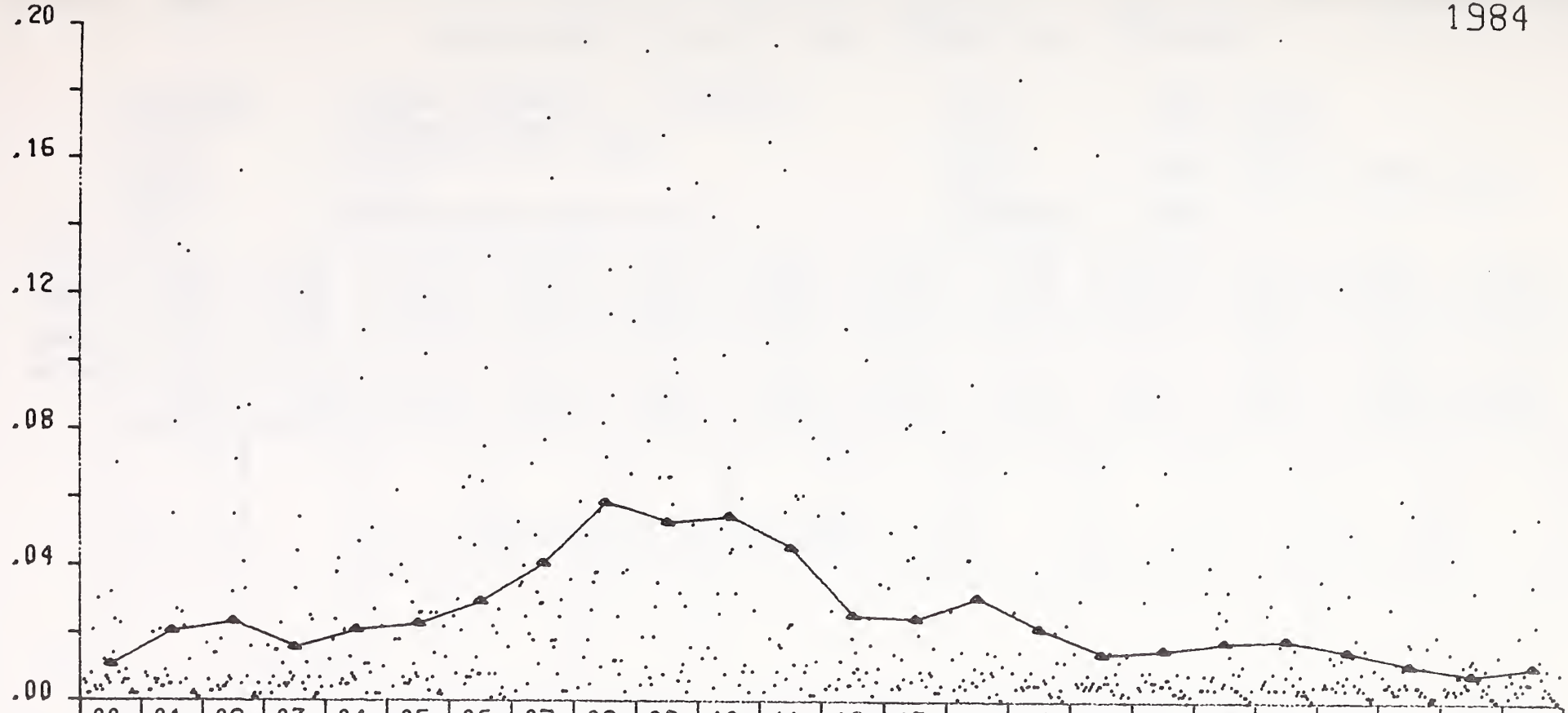
MONTANA STATE AIR QUALITY BUREAU

JUNE 14, 1985

TECHNICAL SERVICES

Figure AP-12-I

SEPTEMBER
1984



	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
NUM-OBS	30	30	30	30	30	30	30	30	30	30	28	28	27	27	27	28	30	29	29	29	30	30	30	30
1-HIGH	.070	.134	.156	.120	.109	.119	.131	.172	.271	.192	.222	.194	.110	.082	.378	.184	.162	.091	.215	.197	.123	.060	.043	.055
2-HIGH	.032	.132	.087	.054	.095	.102	.098	.154	.195	.167	.179	.165	.101	.081	.094	.164	.070	.068	.040	.070	.050	.056	.033	.052
HR.AVG	.011	.021	.024	.016	.021	.023	.030	.041	.059	.053	.055	.045	.026	.025	.031	.022	.014	.016	.018	.019	.015	.011	.009	.011

PLOT. . . . . CONCENTRATION VERSUS TIME (MON-SUN)
METHOD . . . . . PULSED FLUORESCENT
UNITS . . . . . PARTS PER MILLION
STANDARDS . . . (STATE) .50 PPM 1-HR AVG

PARAMETER . . SULFUR DIOXIDE
AREA. . . . . 0080, YELLOWSTONE COUNTY
SITE. . . . . 065, LOCKWOOD PARK
CITY. . . . . BILLINGS

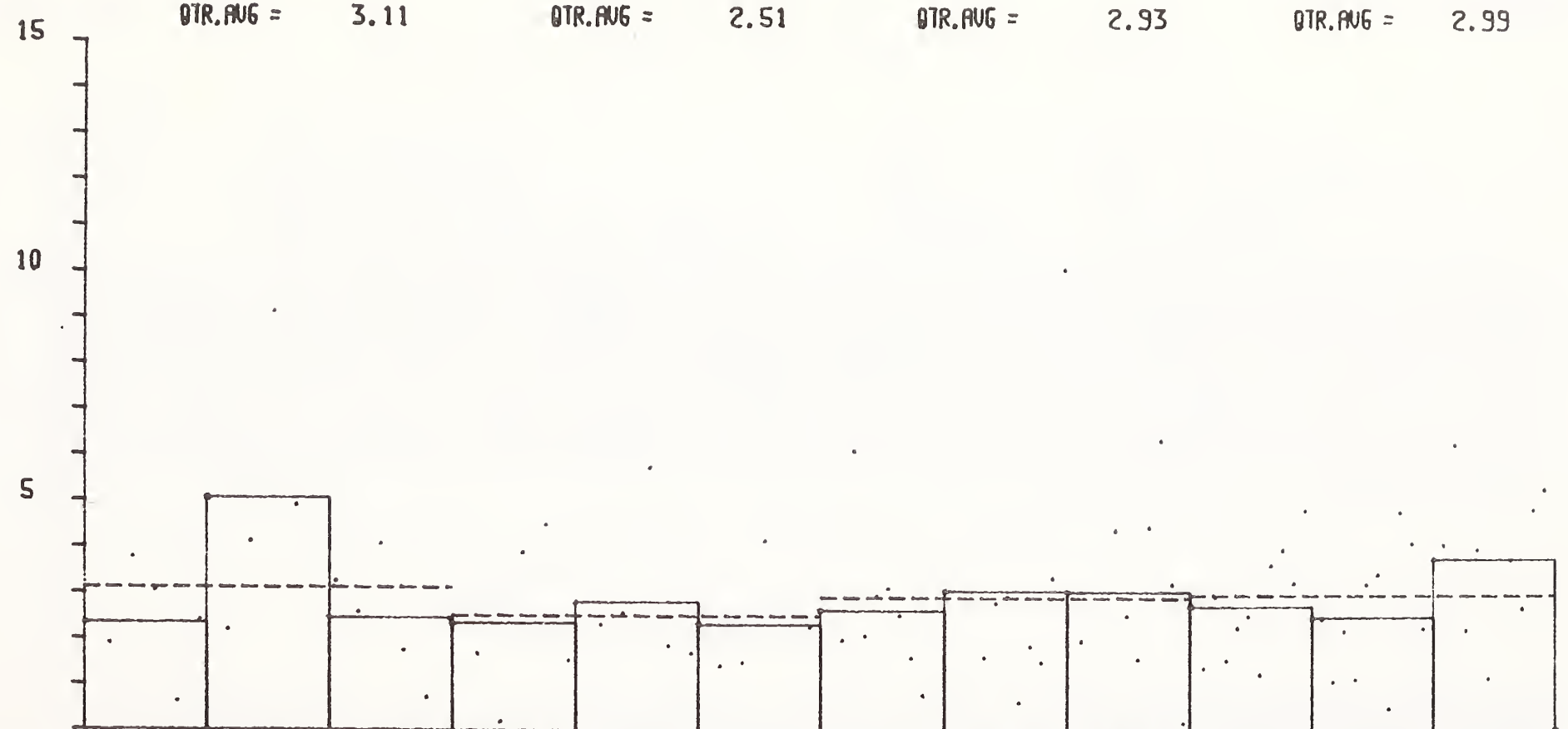
MONTANA STATE AIR QUALITY BUREAU

JUNE 14, 1985

TECHNICAL SERVICES

Figure AP-13-I

1983



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUM-OBS	5	4	6	5	5	4	8	8	8	10	10	9
1-HIGH	3.76	9.09	4.05	4.47	5.7	4.12	6.07	10.0	6.31	4.82	4.77	6.24
2-HIGH	3.06	4.88	3.25	3.88	2.56	2.27	3.11	3.34	4.43	3.95	4.11	5.27
NO.AVG	2.35	5.06	2.46	2.35	2.82	2.32	2.63	3.08	3.07	2.75	2.52	3.80

PLOT. . . . . CONCENTRATION VERSUS TIME
METHOD . . . . . HI VOL
UNITS . . . . . MICROGRAMS/CUBIC METER
STANDARDS . . . (FEDERAL) QUARTER - 1.5 UG/CU.M

PARAMETER . . LEAD
AREA. . . . . 0860, LEWIS & CLARK COUNTY
SITE. . . . . 002, HASTIE
CITY. . . . . EAST HELENA

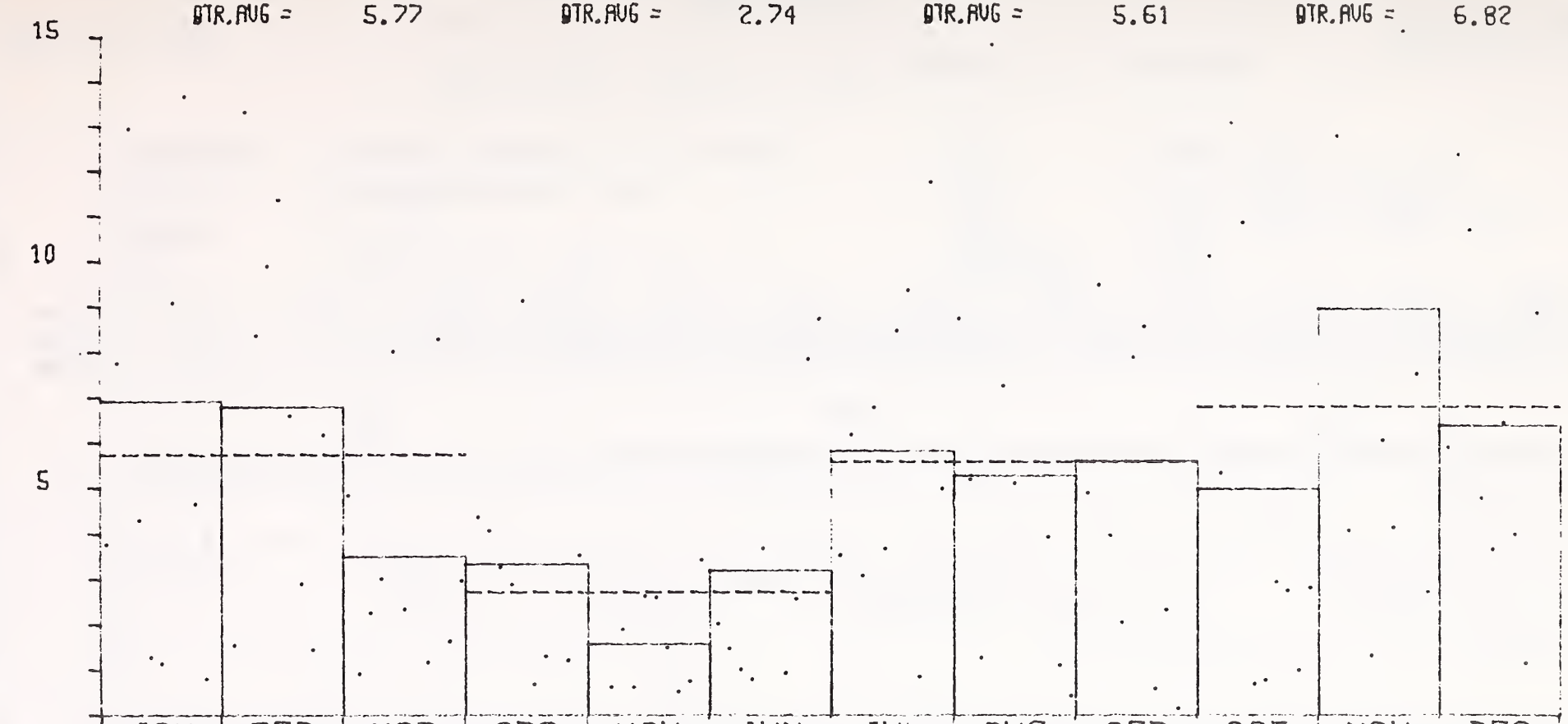
MONTANA STATE AIR QUALITY BUREAU

MARCH 27, 1985

TECHNICAL SERVICES

Figure AP-14-I

1984



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUM-OBS	11	9	10	9	9	9	10	9	10	10	10	9
1-HIGH	17.1	13.2	8.26	9.1	3.42	8.71	11.7	14.7	16.5	13.0	19.2	12.3
2-HIGH	13.6	11.3	8	4.35	2.63	7.82	9.35	8.72	9.45	10.8	17.0	10.6
MO.AVG	6.94	6.82	3.53	3.37	1.61	3.23	5.86	5.31	5.64	5.02	8.99	6.42

PLOT. . . . . CONCENTRATION VERSUS TIME
METHOD . . . . . HI VOL
UNITS . . . . . MICROGRAMS/CUBIC METER
STANDARDS . . . (FEDERAL) QUARTER - 1.5 UG/CU.M

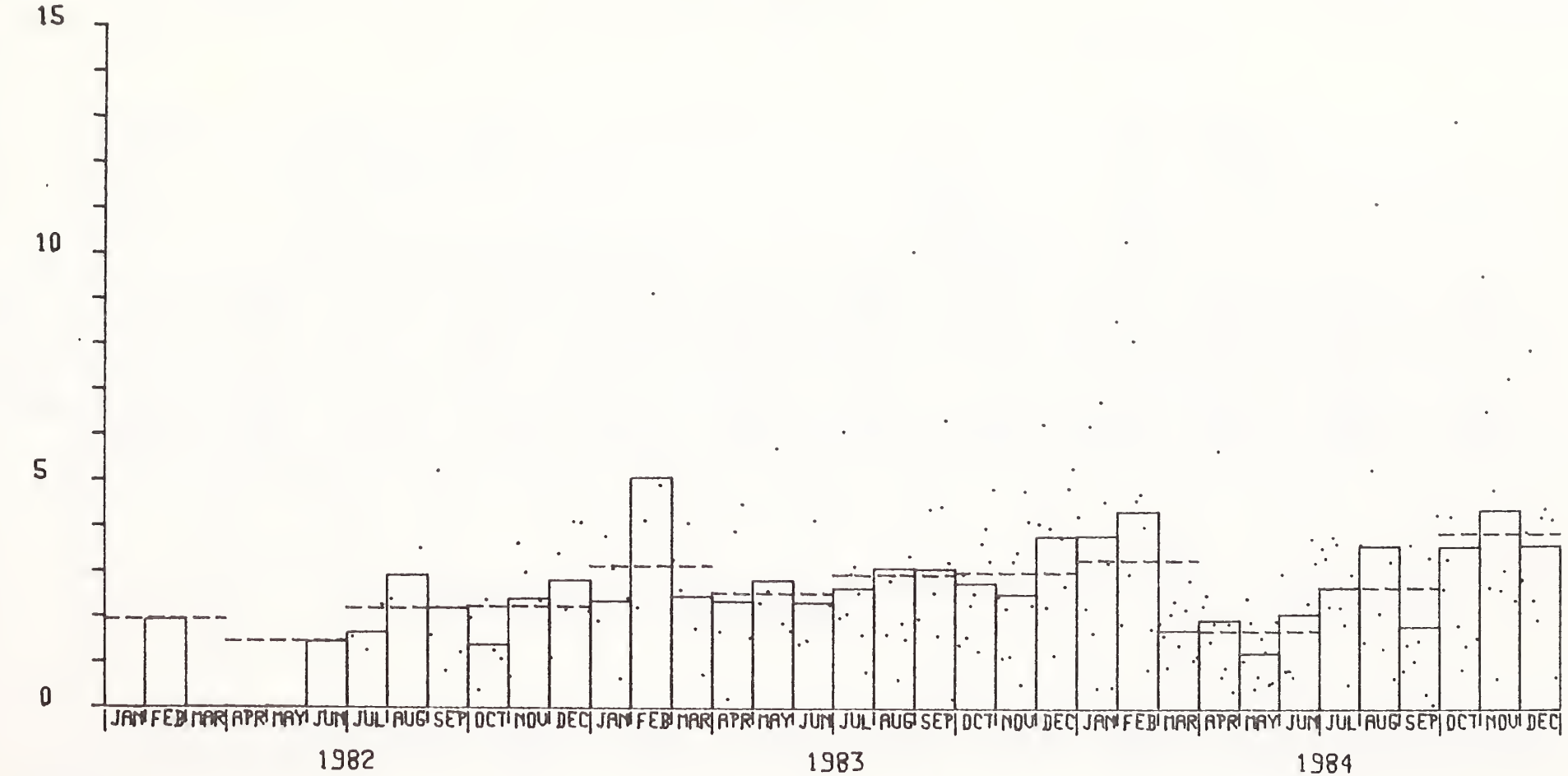
PARAMETER . . LEAD
AREA. . . . . 0860, LEWIS & CLARK COUNTY
SITE. . . . . 714, FIREHALL
CITY. . . . . EAST HELENA

MONTANA STATE AIR QUALITY BUREAU

JUNE 26, 1985

TECHNICAL SERVICES

Figure AP-15-I


15
10
5
0
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
1982
1983
1984

NUM OBS		1				1	3	2	4	5	4	6	5	4	6	5	5	4	8	8	8	10	10	9	10	9	10	9	10	7	9	8	9	8	9	9
MO.AVG		1.9				1.4	1.6	2.9	2.2	1.4	2.4	2.8	2.3	5.0	2.4	2.3	2.8	2.3	2.6	3.0	3.0	2.7	2.5	3.8	3.8	4.3	1.7	1.9	1.2	2.0	2.6	3.5	1.8	3.5	4.3	3.6
QTR.AVG		1.94				1.46				2.18				2.23				3.11				2.51			2.93			2.99			3.26			1.71			2.66			3.86		

PLOT. . . . . CONCENTRATION VERSUS TIME

METHOD . . . . . HI VOL

UNITS . . . . . MICROGRAMS/CUBIC METER

STANDARDS . . . (FEDERAL) QUARTER - 1.5 UG/CU.M

PARAMETER . . LEAD

AREA. . . . . 0860, LEWIS & CLARK COUNTY

SITE. . . . . 002, HASTIE RESIDENCE

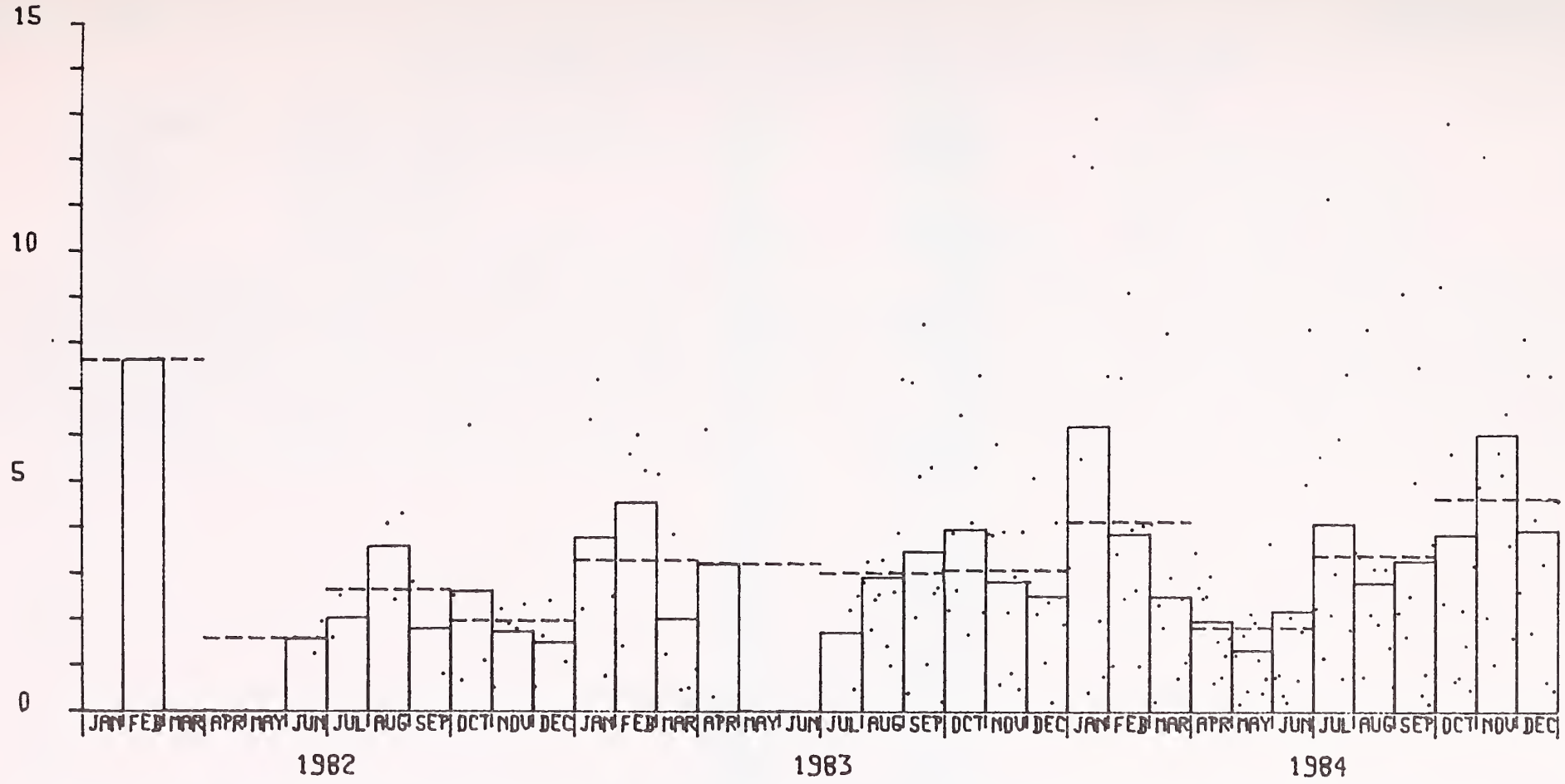
CITY. . . . . EAST HELENA

MONTANA STATE AIR QUALITY BUREAU

JUNE 28, 1985

TECHNICAL SERVICES

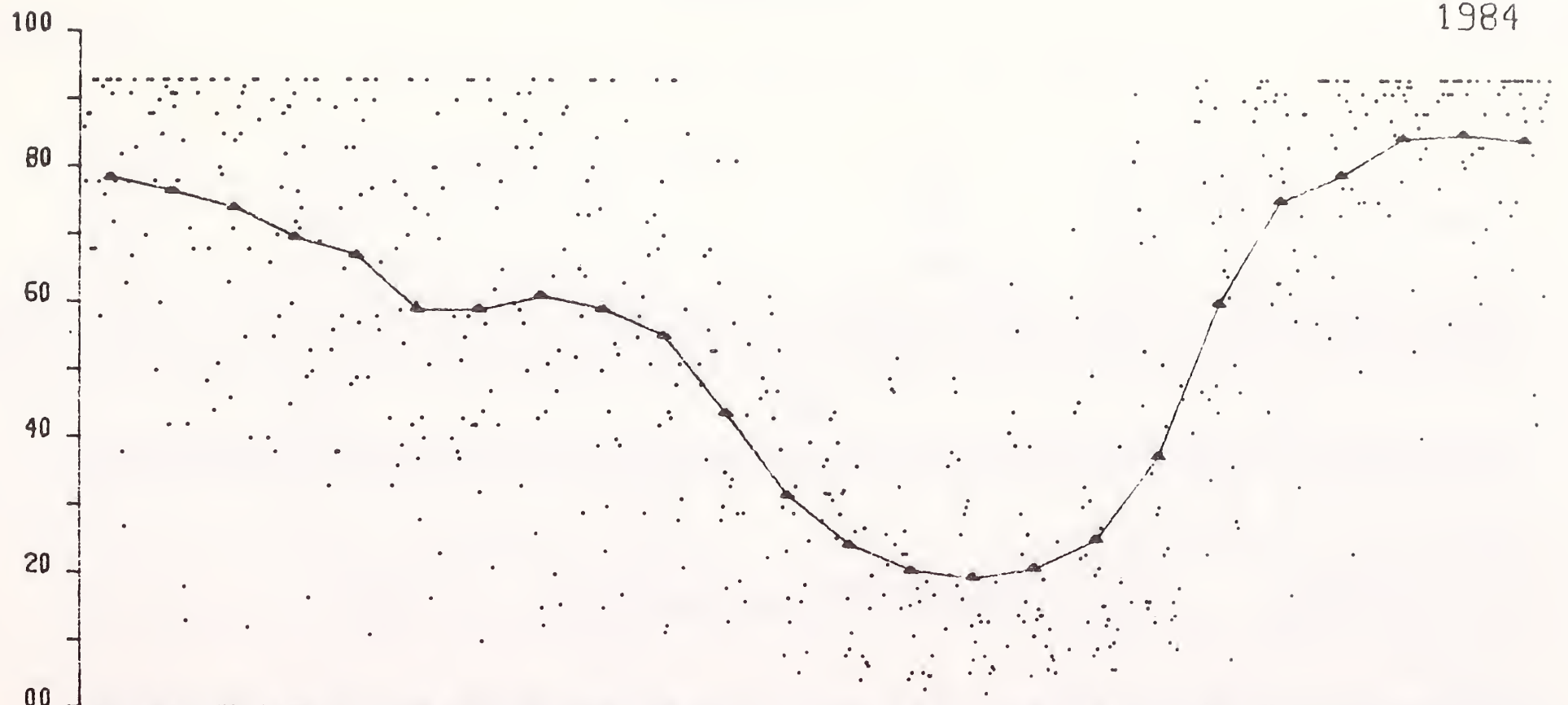
Figure AP-16-I



NUM OBS		1				2	2	3	2	5	5	5	5	4	6	2			3	11	10	9	10	10	9	9	10	10	10	9	10	10	10	10	10	9
MO.AVG		7.6				1.5	2.0	3.5	1.8	2.6	1.7	1.5	3.7	4.5	2.0	3.2			1.7	2.9	3.4	3.9	2.8	2.5	6.1	3.8	2.4	1.9	1.3	2.1	4.0	2.8	3.2	3.8	6.0	3.9
QTR.AVG		7.62				1.69				2.63				1.95					3.27				3.2			3.00				3.07				4.12		

Figure AP-17-I

FEBRUARY
1984



	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
NUM-OBS	29	29	29	29	29	29	29	29	28	26	25	23	26	26	26	28	29	29	29	29	29	29	29	29
1-HIGH	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7	80.7	60.7	43.7	51.7	48.7	62.7	70.7	90.7	92.7	92.7	92.7	92.7	92.7	92.7
2-HIGH	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7	80.7	58.2	42.7	48.7	46.7	55.7	60.7	83.7	91.7	92.7	92.7	92.7	92.7	92.7
MR.AVG	78.3	76.4	73.9	69.5	66.9	58.9	58.9	60.9	58.9	55.0	43.6	31.5	24.2	20.4	19.4	20.7	25.0	37.3	59.8	74.8	78.7	84.1	84.7	83.8

PLOT. . . . . CONCENTRATION VERSUS TIME (MON-SUN)
METHOD . . . . . NEPHELOMETER
UNITS . . . . . SCATTER COEFFICIENT (X10**5)
STANDARDS . . . (STATE) 3X10**-5/METER

PARAMETER . . BETA (LIGHT) SCATTER
AREA. . . . . 0900, LINCOLN COUNTY
SITE. . . . . 016, WRECKING YARD
CITY. . . . . LIBBY

MONTANA STATE AIR QUALITY BUREAU

JUNE 27, 1985

TECHNICAL SERVICES

APPENDIX J

Smoke Management

APPENDIX J

SMOKE MANAGEMENT

The Smoke Management Plan was devised by the State Airshed Group to coordinate burning operations on all forest and rangeland in the state. The State Airshed Group consists of representatives from the following agencies and forest products industries:

Air Quality Bureau
U. S. Forest Service
Bureau of Land Management
National Weather Service
Glacier National Park
Yellowstone National Park
U.S. Dept. of Fish & Wildlife
Champion International
Bureau of Indian Affairs
Montana Division of Forestry
Plum Creek Timber Company
Mont. Dept. of Fish, Wildlife & Parks
Missoula City-County Air Pollution Control Board

From September 1 to November 30 each year, a two-person monitoring team is established at the Montana Division of Forestry office in Missoula. This team gathers meteorological information daily and has the authority to issue burning restrictions on days forecast for poor ventilation. Restrictions are issued only for those areas predicted to experience inversions or poor dispersion. Restriction information is available from the U. S. Forest Service Fire Weather network, or by calling the state toll-free number (1-800-225-6779). The map on the following page (Figure AP-1-J) shows the ten designated airsheds in Montana. The success of this plan involves the cooperative effort of all organizations involved in the use of prescribed burning for disposal of slash and other accepted land management practices.

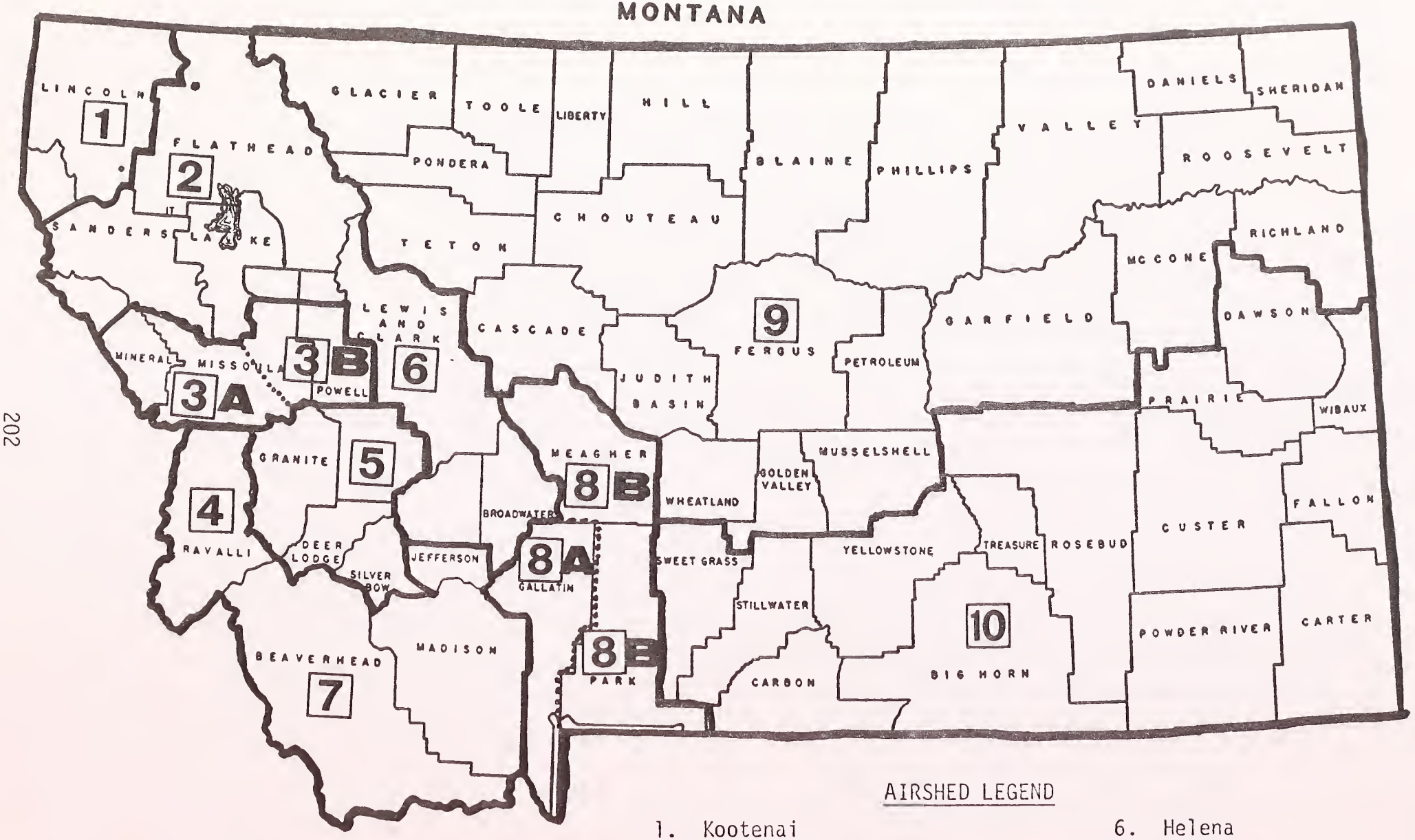


Figure AP-1-J

AIRSHED LEGEND

1. Kootenai
2. Flathead
3. Blackfoot-Clark Fork
4. Bitterroot
5. Upper Clark Fork
6. Helena
7. Beaverhead
8. A. Gallatin
   B. Park
9. Missouri
10. Yellowstone

APPENDIX K

Hi-vol Schedules

APPENDIX K

HI-VOL SCHEDULES

High volume samplers (hi-vols) are usually operated on a one-in-six day schedule. In order to meet the needs of data collectors or hi-vol operators, hi-vol schedules for 1985 and 1986 are presented on the following pages.

Figure AP-1-K

1985

1985 SAMPLING SCHEDULE

(Every 6th Day)

QUARTER 1

January	February	March
1	6	2
7	12	8
13	18	14
19	24	20
25		26
31		

QUARTER 2

April	May	June
1	1	6
7	7	12
13	13	18
19	19	24
25	25	30
	31	

QUARTER 3

July	August	September
6	5	4
12	11	10
18	17	16
24	23	22
30	29	28

QUARTER 4

October	November	December
4	3	3
10	9	9
16	15	15
22	21	21
28	27	27
January (1986) 2		
8		
14		
20		
26		

NOTE: The sampler should start at midnight, run for 24 hours on the date shown, and be stopped at midnight.

Figure AP-2-K

1986

1986 SAMPLING SCHEDULE

(Every 6th Day)

QUARTER 1

January	February	March
2	1	3
8	7	9
14	13	15
20	19	21
26	25	27

QUARTER 2

April	May	June
2	2	1
8	8	7
14	14	13
20	20	19
26	26	25

QUARTER 3

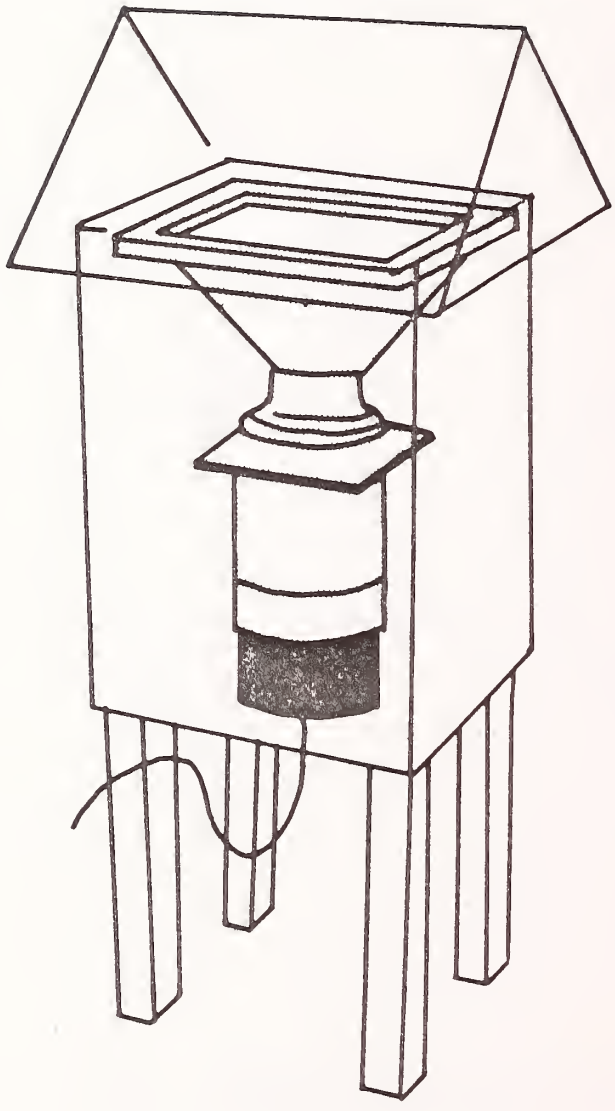
July	August	September
1	6	5
7	12	11
13	18	17
19	24	23
25	30	29
31		

QUARTER 4

October	November	December
5	4	4
11	10	10
17	16	16
23	22	22
29	28	28

January (1987)
3
9
15
21
27

NOTE: The sampler should start at midnight, run for 24 hours on the date shown, and be stopped at midnight.



APPENDIX L

Visible Emission Documentation

APPENDIX L

VISIBLE EMISSION DOCUMENTATION

Visible emission documentation on a pollution source is performed by a trained observer in the field. A pollution source may be a teepee burner, asphalt plant, boiler, power plant or any stack or emission point that might exhibit a plume.

Visible emission readings are taken by the observer in five percent increments of opacity. Opacity is defined as the degree, expressed in percent, to which emissions reduce the transmission of light and obscure the view of an object in the background.

All point sources have opacity limitations. These are listed in the air quality rules. The opacity standards range from 10 to 40 percent and depend on the type and age of the source.

In order for a person to became a trained observer, he or she must attend a visible emissions documentation course or "smoke school." The Air Quality Bureau offers a smoke school twice each year, usually in April and October. The observer must attend a lecture session and pass a field session in order to pass smoke school.

The lecture section includes the following topics:

Definition of opacity

Composition of Plumes

Meteorological aspect of Plumes

Smoke Generator

Method 9 Certification Procedures and Field Documentation

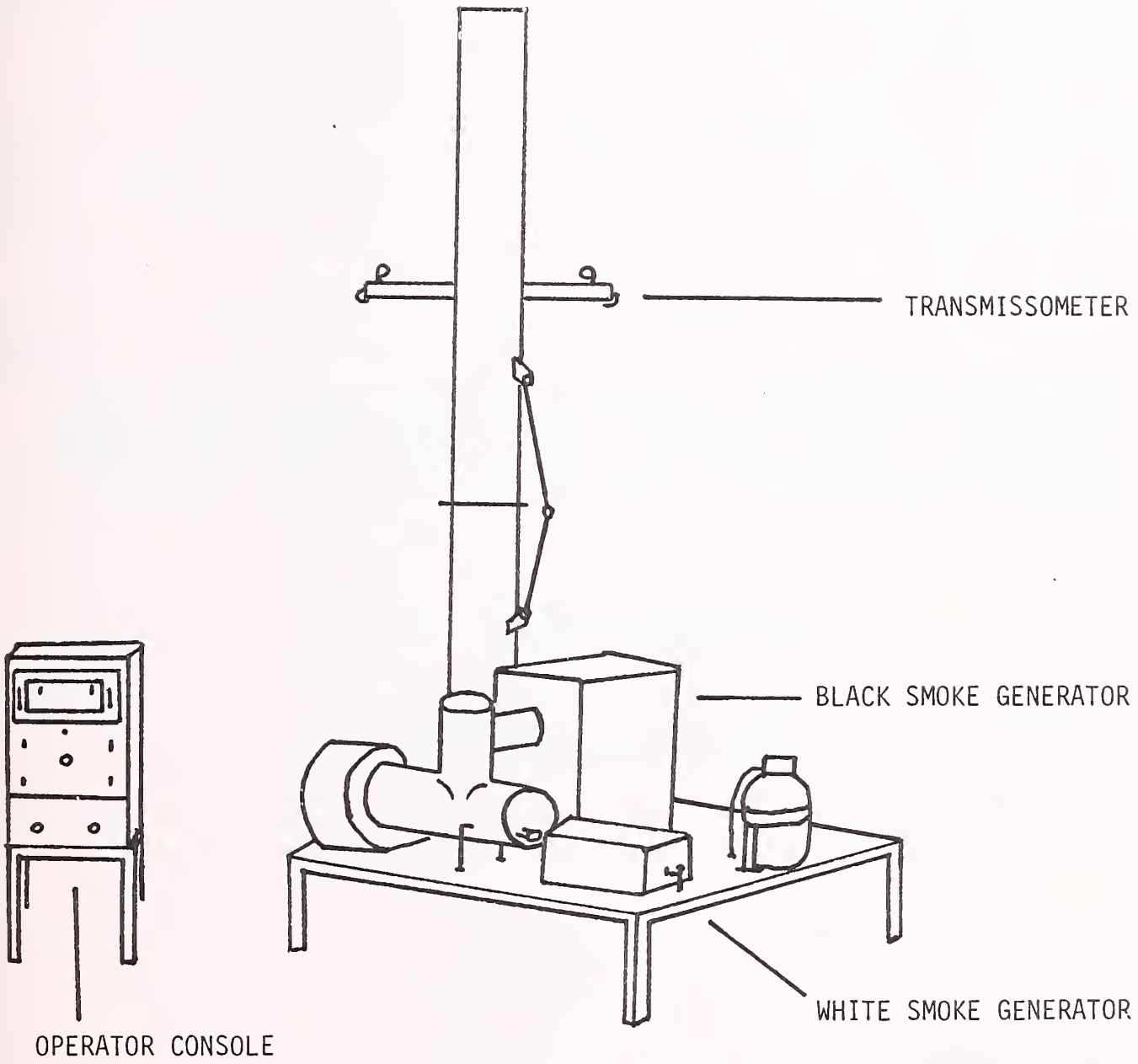
Opacity Regulations

Legal Aspects of Opacity

During the field portion, the observer reads the opacity of 25 black and 25 white smoke plumes produced by a smoke generator. Observed opacities are compared with measured opacities (transmissometer readings) and a certain degree of accuracy is needed to pass.

After a person passes smoke school, that observer is qualified to read the opacity of a plume in the field. A plume must be read every 15 seconds for six minutes, for a total of 24 readings. An average of the 24 readings gives the percent opacity. Care must be taken not to read a steam plume if one exists.

A drawing of the smoke generator (Figure AP-1-L) and a visible emission documentation form (Figure AP-2-L) are copied on the following pages.



ENVIRONMENTAL INDUSTRIES

MODEL 3000

SMOKE GENERATOR

Figure AP-1-L

MONTANA STATE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
AIR QUALITY BUREAU

VISIBLE EMISSIONS FIELD DOCUMENTATION

FIRM NAME _____ DATE _____
ADDRESS _____ START TIME _____
BUSINESS _____ STOP TIME _____
DESCRIPTION OF SOURCE _____ OBSERVER _____
_____ OBSERVATION POINT _____
TYPE OF FUEL _____ _____
STACK HEIGHT _____ STACK DIAMETER _____ _____
DISTANCE FROM STACK _____ ☐ RESPONSE TO COMPLAINT
DIRECTION FROM STACK _____ ☐ ROUTINE INSPECTION
GENERAL PLUME CHARACTERISTICS (COLOR, ETC.) ☐ OBSERVATION
_____ ☐ SPECIAL INVESTIGATION
GENERAL METEOROLOGY: SKY CONDITIONS AND COLOR _____ EST. AMBIENT
AIR TEMP. _____ EST. WIND SPEED _____ DIRECTION _____ EST. RELATIVE HUMIDITY _____

PLUME DENSITY READINGS: IN OPACITY

MIN \ SEC	0	15	30	45	REMARKS
0					
1					
2					
3					
4					
5					

MIN \ SEC	0	15	30	45	REMARKS
0					
1					
2					
3					
4					
5					

0					
1					
2					
3					
4					
5					

0					
1					
2					
3					
4					
5					

0					
1					
2					
3					
4					
5					

0					
1					
2					
3					
4					
5					

OTHER REMARKS _____

AVERAGE PLUME DENSITY OPACITY _____ TOTAL MINUTES IN VIOLATION _____

IF VIOLATION NOTED, PERSON CONTACTED _____ DATE _____ TIME _____

Figure AP-2-L

VISIBLE EMISSION DOCUMENTATION FORM

APPENDIX M

Air Quality Personnel

APPENDIX M

AIR QUALITY PERSONNEL
1984

Air Quality Bureau

(406) 444-3454
(406) 248-3266 (Billings)

Harold Robbins, Chief
Dean Arthun (Billings)
John Coefield
Patricia Davidson
Pat Driscoll
Kay Hansen
Charles Homer
Shirley Quick Jasper
Bob Jeffrey
Harry Keltz
David Maughan
Jackley Meyers
Warren Norton
Jim Olsen
Jerry Preszler
Bob Raisch
Jerry Schneider
Stan Sternberg
Ross Yeager (Billings)

Cascade County Air Pollution Control

(406) 761-1190

William Neilsen
Bruce Treis

Missoula City-County Health Department

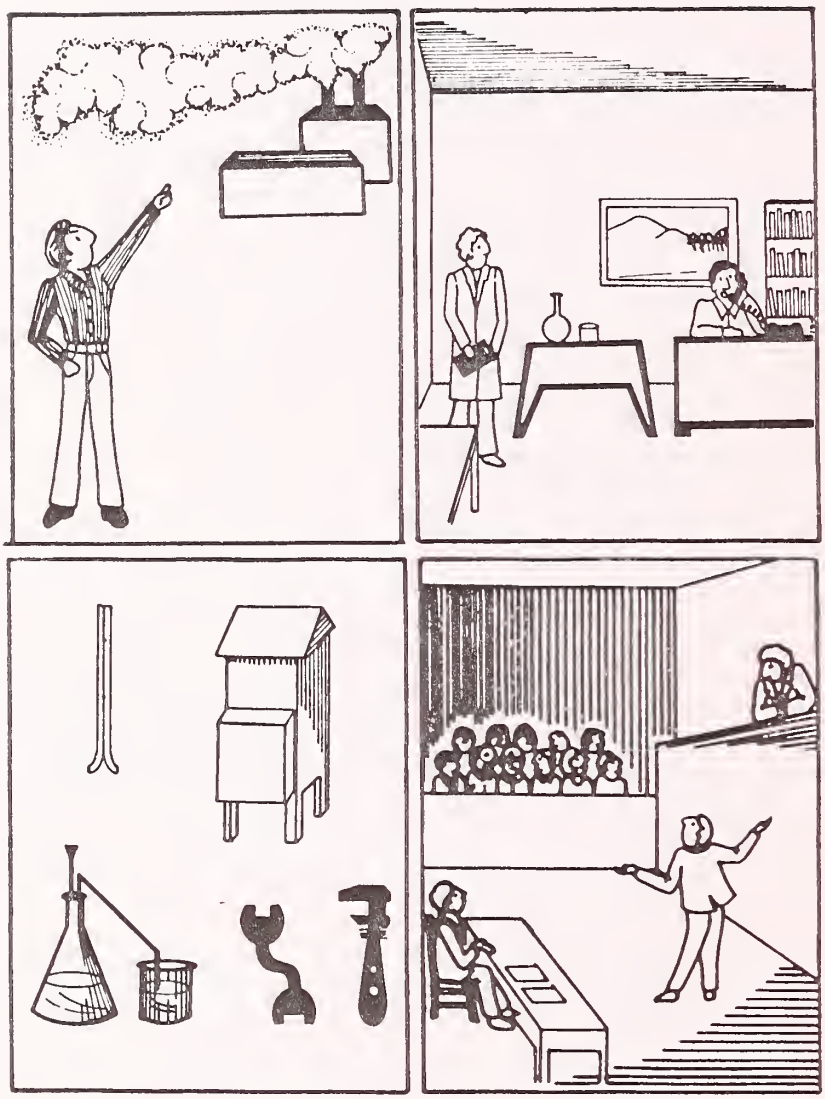
(406) 721-5700

Linda Hedstrom
Jim Carlson
Scott Church
Pat Thorson

Yellowstone County Air Pollution Control

(406) 252-0756

Steve Duganz
Russ Boschee



APPENDIX N

Air Monitoring Equipment

APPENDIX N

Air Monitoring Equipment

This appendix is intended to give the data and information user a brief description of how air monitoring equipment works. Most of the information contained in this appendix was taken from the Air Quality Bureau's Quality Assurance Handbook.

Table AP-N-I gives a summary of the various pollutants and their analytical procedure.

Table AP-N-I

Pollutants and Analytical Procedures

Analyte	Procedure
Total Suspended Particulate	Filter Impaction/Gravimetric Analysis
Particulates	Beta Attenuation
Respirable Particulates (PM10)	Size Selective Hi-vol/Gravimetric Analysis
Respirable Particulates	Dichotomous Virtual Impactor/Gravimetric Analysis
Lead	Filter Impaction/Atomic Absorption Spectrophotometry/ICAP
Carbon Monoxide	Non-dispersive Infrared
Sulfur Dioxide	Pulsed Fluorescence
Hydrogen Sulfide and Sulfur Dioxide	Gas Chromatography and Flame Photometric Detection
Nitrogen Oxides	Chemiluminescence
Ozone	Ultraviolet Photometry
Fluoride	Dual Tape Sampler
Gaseous and Particulate Fluorides	Bicarbonate Tube
Foliar Fluoride	Colorimetric Method
Visibility	Integrating Nephelometer
Metals	ICP or ICAP

Analyte: Total Suspended Particulates (TSP)

Procedure: Filter impaction/gravimetric analysis

General Information:

Particulate matter is collected by a high volume sampler (hi-vol) by pulling a known volume of air through a preweighed glass fiber filter. As the air is pulled through the filter, particulate matter that is suspended in the air is impacted onto the filter material. After the sampler has run for 24 hours, the filter is reweighed. The weight of the particulate matter (grams) on the filter is divided by the volume of air (cubic meters (m^3)) to give a concentration in micrograms per cubic meter (ug/m^3).

The hi-vol is constructed of aluminum in the shape of a box (dimensions 16" x 16" x 48") with a pitched roof. The interior contains a "vacuum cleaner" type electric motor, a filter holder, a flow measuring device(s), and a timer. The samplers usually run on a one-in-six day schedule but may be run more frequently if necessary.

The filters are weighed on a laboratory balance in a temperature and humidity controlled room. The balance must be accurate to one tenth of a milligram (0.1 mg) or one ten thousandth of a gram. The filters are dessicated for twenty-four hours prior to weighing.

Analyte: Particulates

Procedures: Beta attenuation

General Information:

This analyzer measures concentrations of airborne particulates, integrated over preprogrammed time intervals, by the process of beta ray attenuation. Samples are collected on strips of glass fiber tape. Before the sample is collected, the tape is positioned between a beta ray source (C^{14}) and a geiger counter. The beta ray count taken through the tape is used as a blank value. Sample is deposited on the tape by a constant flow of ambient air. The sample and tape are again situated between the source and counter. This second count will be lower than the first count because the sample will absorb some of the beta rays in excess to the amount of X-rays absorbed by the tape itself. The difference in beta ray counts between the tape and the tape plus sample is log proportional to the amount of sample on the tape. After calculating, the sample mass, it is divided by the total airflow over the sample collection period. This gives an integrated particulate concentration for that sample period. All calculations are done internally by the analyzer with a microprocessor. Sample times as low as 3 minutes or as great as 999 minutes can be programmed by the user.

Analyte: Respirable Particulates (PM10)

Procedure: Size Selective Hi-vol/Gravimetric Analysis

General Information:

The PM10 size selective high volume air sampler operates at a high flow rate of 40 cfm and is the same as a TSP hi-vol, but samples suspended particles smaller than 10 microns on an 8 in. x 10 in. hi-vol filter.

Suspended particles in the air are sampled at 40 cfm through the circumferential inlet of the size selective inlet. The symmetrical design insures wind direction insensitivity. The inlet design and the internal configuration make the collection efficiency independent of wind speed from 0 to 24 kilometers per hour. Air is drawn into the inlet and deflected downward into the acceleration jets of the first stage fractionator. By virtue of their larger momentum, particles greater than the 10 micron cutpoint impact onto the first stage collection plate. The remaining particles are carried vertically upward by the air flow and then down through the second fractionation stage which strips additional 10 micron and larger particles. All remaining particles are drawn out of the inlet and through the 8 in. x 10 in. sampling filter. Just as in standard hi-vol TSP sampling, the filter is weighed before and after sampling. The weight increase is the mass of particles smaller than 10 microns. The air volume is properly totalized by maintaining constant flow rate with a flow controller.

Analyte: Respirable and Inhalable Particulates

Procedure: Dichotomous or Virtual Impactor

General Information:

The dichotmous sampler is designed to sample for particulates of two size ranges: 1) those particles less than 3.5 microns (aerodynamic diameter), and 2) those particles greater than 3.5 microns and less than 15 microns. Two 37 millimeter diameter filters collect the particulate, one filter for each size range. The filters are weighed before and after each run to determine the mass loading on each filter. Concentration is then calculated by dividing the net weight by the air flow through each filter. Two rotometers are installed on the sampler to measure the flow during the run.

This type of instrument is divided into two sections: the sampling module and the control module. The sampling module contains the sampling head separation device, and the two filters. The control module contains the air pump, flow controller, rotameters, and the clock mechanism. The two units are connected by polypropylene tubing.

The sampling module is the portion where the actual separation and collection of each particle size is accommplished. The particles larger than 15 microns are eliminated at the round sampling head. A bug screen is placed in the sampling head to keep out insects and to collect particles larger than 15 microns. The particles less than 15 microns proceed down the sampling tube to the nozzle. The nozzle accelerates the particles and forces the majority of air (approximately 90%) to make a sharp 90° turn in a very short distance. This 90° turn is the principle on which the separation is based. Any heavy particle (i.e., any particle greater than 3.5 microns) will not be able to make this sudden turn. These particles will be drawn down into the coarse particles tube which is located straight below the nozzle. The other particles (less than 3.5 microns) will make the 90° turn and will be drawn down the fine particle tube. At the bottom of both tubes are the appropriate filters. The air flow is drawn from the control module through the 3/8" and 1/4" lines.

The filters are weighed on a microbalance in a temperature and humidity controlled room. The balance must be accurate to one millionth of a gram (0.000001 gm). The filters are dessicated for twenty-four hours prior to weighing.

Analyte: Lead

Procedure: Atomic Absorption Spectrophotometry

General Information:

Lead is sampled in the field using a standard hi-volume air sampler. This sampler pulls a large volume of air through a glass fiber filter. The filter is then normally mailed from the field site to the Air Quality Bureau where the sample is logged in. The volume of the air sample is calculated and then it is transferred to the laboratory for analysis. The filter is equilabrated and weighed for total suspended particulate. Then the filter must be extracted using an acidic solution to solubilize the lead on the filter. The resulting solution is analyzed using atomic absorption spectrophotometry or ICAP to determine the amount of lead present.

Analyte: Carbon Monoxide

Procedures: Non-dispersive Infrared

General Information:

The (carbon monoxide) analyzer measures continuous amounts of carbon monoxide from 0-50 to 0-1000 ppm full scale deflection. The detector operates on an infrared absorption principle.

The analyzer detects carbon monoxide from the absorption of infrared radiation. Nondispersive infrared radiation is introduced to the detector with a double-beam arrangement. The infrared beams pass through two cells: (1) a sealed reference cell filled with a non-absorbing gas, and (2) a sample cell through which the sample air containing the carbon monoxide is continuously drawn.

The Infrared Gas Analyzer utilizes the measurement principle based on CO having a known characteristic absorption spectra in the infrared range. The analyzer contains an infrared detector that uses the nondispersive single beam technique with alternate modulation of the sample and reference cells. The reference cell is filled with a nonabsorbing gas and sealed, and the sample is routed through the sample cell. With no CO present in the sample, the amounts of radiation coupled into the detector from the sample and reference cells will be essentially equal, effectively canceling in the detector and producing no output. When CO is present in the sample, some radiation is absorbed by the CO, causing the detector inputs to be unequal, and producing a capacitance change in the detector. The detector is so designed that the amount of capacitance change in the detector is equivalent to a known amount of CO. The infrared radiation is chopped by an optical chopper to cause a periodic capacitance change, which modulates a radio frequency signal from an oscillator. This signal is subsequently demodulated, amplified, and the output is fed to the front panel meter as well as to a strip chart recorder.

Analyte: Sulfur Dioxide

Procedures: Pulsed Fluorescence

General Information:

The sample airstream is exposed to a pulsating ultraviolet light, which electromagnetically excites sulfur dioxide molecules in the air sample. The excited SO_2 molecule quickly decays to its ground state emitting a photon of fluorescent light, whose intensity is measured by a photomultiplier tube. The wavelength of excitation light entering the detection chamber and the wavelength of fluorescent light entering the photomultiplier tube both are carefully controlled by narrow bandpass filters, which reduce interference from other fluorescent species in the sample gas. The light is pulsed for six reasons: long UV lamp life, high intensity UV without lamp heating, small lamp size for UV output, low lamp power requirements, long term UV stability, and chopped signal processing (alternatively measuring signal and photomultiplier dark current). After the photomultiplier dark current is subtracted from the fluorescent SO_2 signal, the signal output is directly proportional to the concentration of SO_2 in the sample gas.

Analyte: Hydrogen Sulfide and Sulfur Dioxide

Procedures: Gas Chromatography and Flame Photometric Detection

General Information:

Ambient air entering the analyzer is separated into two fragments by a gas chromatographic column, one part containing any sulfur dioxide present in the sample and the second component consisting of any hydrogen sulfide. The amount of sulfur atoms in each fragment is detected by a flame photometer. This detection principle consists of burning the sample in a hydrogen rich flame, which produces the excited reduced species S_2. The S_2 decays to ground state emitting a photon near 390nm. This photon is sensed by a photomultiplier tube. Because the measured molecule is a sulfur dimer, the photomultiplier output (picoamps) is nonlinear with respect to ambient sulfur concentrations. The output is approximately to the 1.8 power of the ambient concentration. Deviation from the theoretical second power is due to quenching of the excited species. The photomultiplier output is linearized by a set of logarithmeic amplifiers. The rest of the analyzer consists of flow control devices and temperature controllers for the detector oven and column.

Analyte: Nitrogen Oxides

Procedures: Chemiluminescent Reaction of NO and O_3

General Information:

The analyzer utilizes a chemiluminescent reaction between nitric oxide and ozone to quantitatively determine the concentration of nitrogen oxides in the sample air. Ozone, produced in excess by ultraviolet irradiation of dried air, is reacted with any nitric oxide in the sample air and the resultant chemiluminescent photons are measured with a photomultiplier proportional to the amount of nitric oxide in the sample. A second portion of sample air is routed through a converter which changes all the NO_2 in the sample air to nitric oxide. This gas is reacted in another reaction chamber with the ozone and gives a measurement proportional to the total amount of nitrogen oxides in the sample. Thus, there are two parallel reaction chambers determining the nitric oxide concentration and the total nitrogen oxides concentration. These signals are electronically subtracted to give a nitrogen dioxide concentration.

Analyte: Ozone

Procedures: Ultraviolet Photometry

General Information:

This analyzer works on the principle of absorption of ultraviolet light in the 254nm band by ozone. The principle is similar to an ultraviolet spectrophotometer with a 71cm folded gas cell. A sample of ambient air, selectively scrubbed of ozone, is injected into the cell. The attenuation of ultraviolet light without ozone is determined by a light sensitive diode. The sample cell is flushed and a new sample of air containing ambient levels of ozone is measured for ultraviolet absorption. The sample air without ozone is a reference cell measurement. The difference between the reference measurement and the sample with ozone measurement determines the ultraviolet absorption attributable only to the ozone. This absorption is proportional to the ozone concentration by the Beer-Lambert law. Since only a single detection cell is used in the instrument, ambient air and ozone-scrubbed ambient air are sequentially cycled through the cell. This cycle time is between 20 and 30 seconds. This means that the analyzer will not give correct values in situations in which the ozone concentration changes significantly in 30 seconds. This usually does not present a problem in enforcement monitoring but may be significant in low level research near point sources.

Analyte: Fluoride

Procedures: Dual Paper Tape Collection of HF and Particulates

General Information:

Sample air is drawn through the inlet tube and down through two paper tapes. The first tape is treated with citric acid and functions as a collector for particulates. The citric acid prevents the first tape from reacting with and absorbing gaseous hydrogen fluoride. The second tape is treated with sodium hydroxide and recovers better than 95 percent of the hydrogen fluoride at sampling times of 15 to 120 minutes with fluoride loads up to 40 ug/m^3. The sample air is drawn through a soda lime scrubber which removes the fluorides. The scrubbed air is drawn through a soda lime scrubber which removes the fluorides. The scrubbed air is used to pressurize the cabinet containing the sample tape rolls, thus preventing unwanted fluoride contamination of the tape by the instrument's operating environment. At preprogrammed time intervals the sampler shuts off the sample pump, indexes the tape and then samples a new section of tape. Approximately 600 samples can be collected on each tape set. The sample spots are cut out of the tape and subjected to one of the standard acceptable methods of fluoride analysis.

Analyte: Gaseous and Particulate Fluorides

Procedure: Bicarbonate Tube

General Information:

Sample air is drawn through a glass tube which has sodium bicarbonate coated on the inner wall of the tube. The bicarbonate removes gaseous fluorides from the sample stream. A filter at the end of the tube captures the particulates from the sample. After the normal sampling interval (usually 24 hours), the sample flow is stopped. The filter is retained for analysis of particulate fluorides. The bicarbonate is washed out of the tube and analyzed for fluoride content. Recovery of gaseous HF is about 95% up until saturation of the tube at 500 ug F. Sample air which is high in acids (SO_2, NO_2, O_3 and hydrocarbons, at 50% or greater relative humidity) will react with the bicarbonate in the tube and reduce collection efficiency and total fluoride holding capacity. The lower detectable limit of the method is a function of the quality of the bicarbonate used for coating the tubes. Bicarbonate containing significant fluoride contamination will not have the low level resolution of fluoride free bicarbonate. The minimum detectable limit is determined as two standard deviations of the mean of the blank values. The blanks come from sample tubes which have been prepared for sampling but are maintained unexposed.

Analyte: Foliar Fluorides

Procedure: Colorimetric Method

General Information:

Forage samples are collected from pre-selected areas twice per month. Such areas must be growing hay or silage or being grazed by livestock when the samples are collected. Each sample consists of a composite of at least 25 clippings collected in a predetermined geometric pattern over the area. The entire aerial portion of the plant over 3 cm above the ground is collected.

The samples are collected and stored in Kraft bags under carefully regulated temperatures awaiting laboratory analysis. In the laboratory the samples are air dried at 80° C for 24-48 hours. The samples are then milled to pass a 40 mesh sieve. The milled samples are dissolved in solution, distilled, buffered and analyzed with a colorimeter or by the specific ion electrode procedure.

Analyte: Visibility

Procedure: Integrating Nephelometer

General Information:

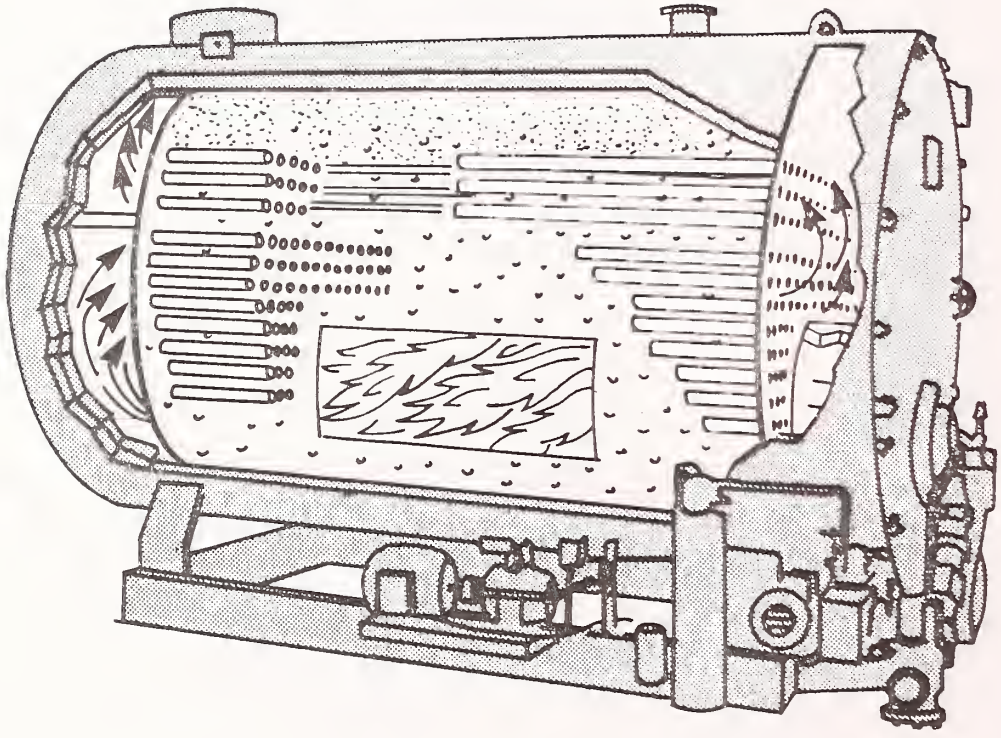
The visibility is determined by the measurement of the atmospheric extinction coefficient due to light scattering by both gases and aerosols in the air. The quantitative output can be displayed in units of scattering coefficient, meteorological range, or mass concentration of particulates. The air is drawn into a one-meter long tube where light is flashed across the air stream at right angles to the photodetector. Any light scattered due to particulates will be detected and recorded on a strip chart recorder.

Analyte: Metals

Procedure: ICP or ICAP

General Information:

Samples are nebulized and the aerosol that is produced is transported to the plasma torch where excitation occurs. Characteristic atomic-line emission spectra are produced by a radio-frequency inductively coupled plasma (ICP). The spectra are dispersed by a grating spectrometer and the intensities of the lines are monitored by photomultiplier tubes. The photocurrents from the photomultiplier tubes are processed and controlled by a computer system. A background correction technique is required to compensate for variable background contribution to the determination of trace elements. Background must be measured adjacent to analyte lines on samples during analysis. The position selected for the background intensity measurement, on either or both sides of the analytical line, will be determined by the complexity of the spectrum adjacent to the analyte line. The position used must be free of spectral interference and reflect the same change in background intensity as occurs at the analyte wavelength measured. Background correction is not required in cases of line broadening where a background correction measurement would actually degrade the analytical result.



APPENDIX O

Air Quality Data Processing Information

APPENDIX O

AIR QUALITY DATA PROCESSING INFORMATION

Agencies and companies often need to submit their air monitoring data to the state's computer system (AQDHS). This appendix is a brief summary of the various data forms and magnetic tape requirements for submitting data.

Figures AP-1-O through AP-4-O show four keypunch forms used for hourly, daily, and monthly data. Forms 2179 and BAC are used for daily (24-hour) data while form BAQ is generally used for monthly data. The SAROAD form is used only for hourly data. Brief instructions for forms 2179 and SAROAD follow the figures. Some parameter codes are listed.

Agencies and companies may submit their data on magnetic tapes. The data must be of the same format as the before-mentioned keypunch forms. Tape requirements are as follows:

Standard IBM label (if labeled)

Prefer Non-labeled (NL)

9-track tape

800, 1600, 6250 BPI's (specified)

80 characters

Any blocking size (specified)

EBCDIC

SAROAD on one file only

BAC, BAQ, 2179 one file only

STATE OF MONTANA
DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES
AIR QUALITY BUREAU

Date Received: _____

Analyst: _____

Date Completed: _____

	2	7
1	2	3

HV Mem. Dichot.

Parameter	Parameter	Parameter	Parameter
23 24 25 26 27	37 38 39 40 41	51 52 53 54 55	65 66 67 68 69

Method Units DP	Method Units DP	Method Units DP	Method Units DP
28 29 30 31 32	42 43 44 45 46	56 57 58 59 60	70 71 72 73 74

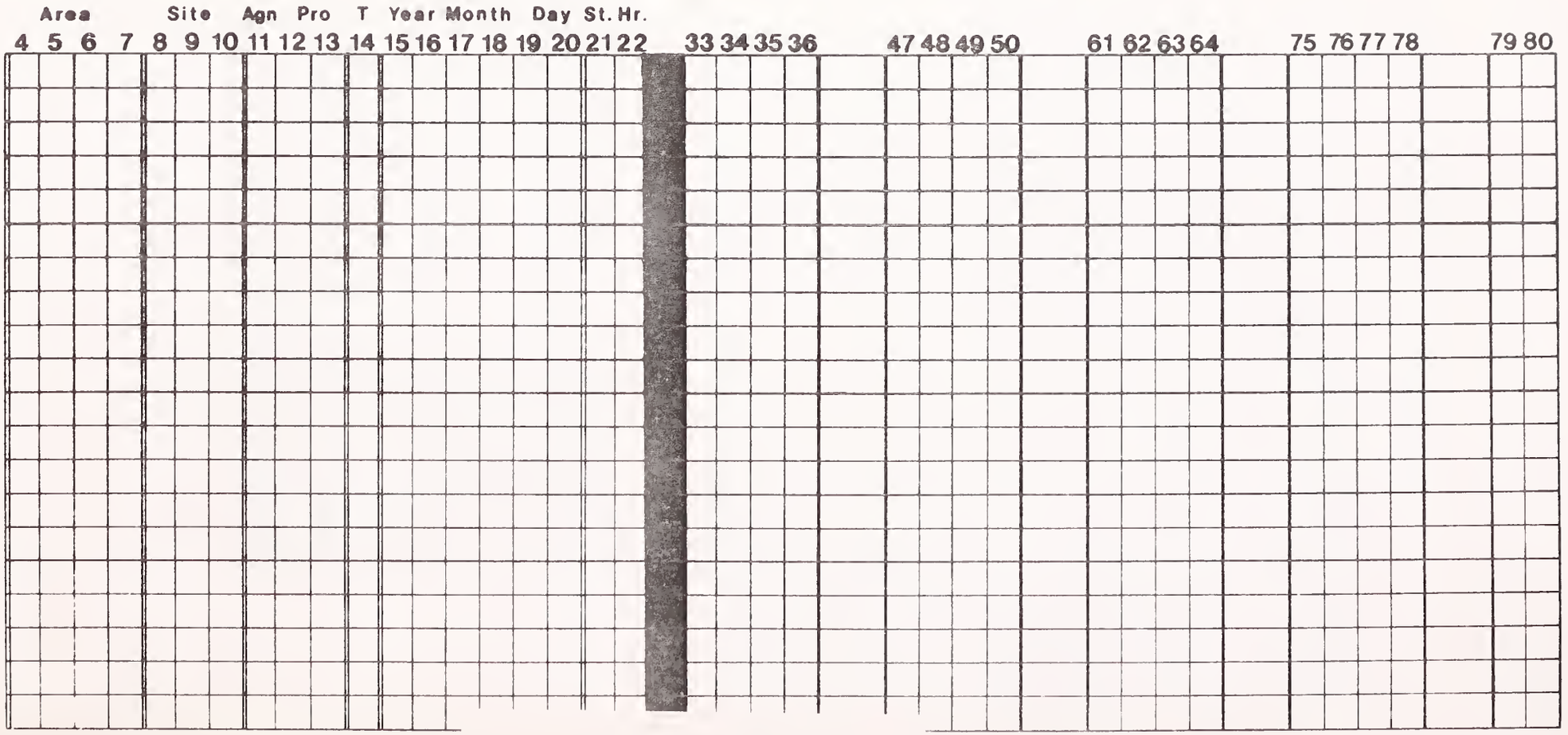


Figure AP-1-0

Form: 2179 Comments:

DATA INPUT FORM - 2179

MONTANA STATE DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES
Helena, Montana

State	Agency	Project	Time	Year	Period (month)	Number of Spls.	Comp Spl. Type Time
2 3	11	12 13	14	15 16	17 18	19 20	21 22

2

Area Address

Collected By

Date Received Date Reported

Analyst

Comments or unusual activities:

Lab. No.	Sample No.	Location and Description	Date Out	Date In	Sampling Period	Area 4 5 6 7	Site 8 9 10

Name PARAMETER Code	Method	Units	DP
23 24 25 26 27	28 29 30 31 32	33 34 35 36	4 3 2 1 0
37 38 39 40 41	42 43 44 45 46	47 48 49 50	4 3 2 1 0
51 52 53 54 55	56 57 58 59 60	61 62 63 64	4 3 2 1 0
65 66 67 68 69	70 71 72 73 74	75 76 77 78	4 3 2 1 0

Figure AP-2-0

DATA INPUT FORM - BAC

BAC 3-72

STATE DEPARTMENT OF HEALTH

AND ENVIRONMENTAL SCIENCES

HELENA, MONTANA

24-HOUR OR GREATER SAMPLING INTERVAL

[2]

1 Agency

City Name

Site Address

Project

Time Interval

State Area Site (2 3 4 5 6 7 8 9 10)

Agency Pro. T. Year Month (11 12 13 14 15 16 17 18)

Collection Day (19 20)	Lab. No.	Filter No.	Date Sample Logged	Operator	Total Volume Air (M^3)	Unusual Circumstance *	Day (19 20)	21 22
01							01	
02							02	
03							03	
04							04	
05							05	
06							06	
07							07	
08							08	
09							09	
10							10	
11							11	
12							12	
13							13	
14							14	
15							15	
16							16	
17							17	
18							18	
19							19	
20							20	
21							21	
22							22	
23							23	
24							24	
25							25	
26							26	
27							27	
28							28	
29							29	
30							30	
31							31	

TSP	Org	As	Pb	Cd	Zn	SO_4	
Name	Name	Name	Name	Name	Name	Name	Name
PARAMETER Code	PARAMETER Code	PARAMETER Code	PARAMETER Code	PARAMETER Code	PARAMETER Code	PARAMETER Code	PARAMETER Code
(23 24 25 26 27)	(37 38 39 40 41)	(51 52 53 54 55)	(65 66 67 68 69)	(23 24 25 26 27)	(37 38 39 40 41)	(51 52 53 54 55)	(65 66 67 68 69)
Method Units DP	Method Units DP	Method Units DP	Method Units DP	Method Units DP	Method Units DP	Method Units DP	Method Units DP
(28 29 30 31 32)	(42 43 44 45 46)	(56 57 58 59 60)	(70 71 72 73 74)	(28 29 30 31 32)	(42 43 44 45 46)	(56 57 58 59 60)	(70 71 72 73 74)
DP → 4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0

Day (19 20)	33 34 35 36	47 48 49 50	61 62 63 64	75 76 77 78	33 34 35 36	47 48 49 50	61 62 63 64	75 76 77 78
01								
02								
03								
04								
05								
06								
07								
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14								
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24								
25								
26								
27								
28								
29								
30								
31								

Comments or unusual circumstances

* codes 0 = excess of 24 hr. 5 = dry
1 = approx. 72°F 6 = clear
2 = approx. 32°F 7 = hazy
3 = rain 8 = calm
4 = snow 9 = windy

BAQ
3/72

Figure AP-3-0

DATA INPUT FORM - BAQ

LESS THAN 24-HOUR SAMPLING INTERVAL

AIR QUALITY BUREAU

1 Agency

City Name

Site Address

Project

Parameter observed

Method

Time interval of obs.

Units of obs.

State 27 | Area | Site

Agency | Project | Time | Year | Month

Parameter code | Method | Units | DP

Day	St	Hr	Rdg 1	Rdg 2	Rdg 3	Rdg 4	Rdg 5	Rdg 6	Rdg 7	Rdg 8	Rdg 9	Rdg 10	Rdg 11	Rdg 12
01	00													
01	12													
02	00													
02	12													
03	00													
03	12													
04	00													
04	12													
05	00													
05	12													
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13	00													
13	12													
14	00													
14	12													
15	00													
15	12													
16	00													

Figure AP-4-0

DATA INPUT FORM - SAROAD

FORM 2179

Col 1	Will always be coded 2, which indicates a 24-hour sample
Col 4-10	Area and site codes (different for each site, supplied by AQB)
Col 11	Agency code = J (indicates company, other letters indicate agencies)
Col 12, 13	Project code = 02 (or 07 is sampler is co-located)
Col 14	Time code = 8
Col 15-20	Year, month, day the sample was run (YY, MM, DD)
Col 21, 22	Start hour = 00 (for all TSP readings)
Col 23-27	Parameter code = 11101 for TSP
Col 28, 29	Method code = 91 for TSP
Col 30, 31	Unit code = 01 for TSP
Col 32	Decimal code = 0 or 1 depending on analysis - but be consistent
Col 33-36	Data
Col 37-46	Additional parameters
Col 47-50	Space for data for parameter in Col 37-46, and so on
Col 79	Blank
Col 80	Always coded 2 to indicate new data

SAROAD FORMS

These forms are numbered according to the days of the month. They are filled out similarly to 2179 with these exceptions:

Col 14	Time code = 1 for hourly data
Col 23-32	Parameter, method, unit, decimal depending on monitoring equipment. See Parameter Code Description Table.
Col 33-80	Data (for negative numbers, contact AQB for correct procedure)

PARAMETER CODE DESCRIPTION TABLE

Parameter	Code	Method	Units	Decimal	Method Description
TSP	11101	91	01	0	Gravimetric - ug/m^3
Lead	12128	90	01	2	ICAP - ug/m^3
Carbon Monoxide	42101	11	07	1	NonDispersive IR - ppm
Sulfur Dioxide	42401	20	07	3	Pulsed Fluorescent - ppm
Wind Speed	61101	50	11	1	Electronic Avg-meters/second
	61101	40	12	1	Visual Avg - miles per hour
Wind Direction	61102	50	14	0	Electronic Avg - degrees
	61102	40	14	0	Visual Avg - degrees
Wind Deviation	61106	50	14	0	Electronic Avg - degrees
Temperature	62101	50	17	1	Electronic Avg - °Centrigrade
	62101	40	15	1	Machine Avg - °Fahrenheit

Additional parameter codes are available from the Air Quality Bureau.

APPENDIX P

Acronyms and Abbreviations

APPENDIX P

ACRONYMS AND ABBREVIATIONS

AA	Atomic absorption spectrophotometry
ACFM	Actual cubic feet per minute
ADP	Automatic data processing
AIRS	Aerometric Information Retrieval System
APCA	Air Pollution Control Association
APRAC	Urban diffusion model for CO
AQB	Air Quality Bureau
AQCR	Air Quality Control Region
AQDHS	Air Quality Data Handling System
AQDM	Air Quality Display Model
AQMA	Air Quality Maintenance Area
ARM	Administrative Rules of Montana
As	Arsenic
ASTM	American Society for Testing Materials
BACT	Best Available Control Technology
B(a)P	Benzo-(a)-pyrene
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CALINE	California Line Model for CO
Cd	Cadmium
CDHS	Comprehensive Data Handling System
CDM	Climatological Dispersion Model
CEMS	Continuous emission monitoring system
CFR	Code of Federal Regulations
CO	Carbon monoxide
CO_2	Carbon dioxide
CRM	Certified Reference Material
CRSTER	Single source meteorological model
Cu	Copper
DAS	Data aquisition system
DHES	Department of Health & Environmental Sciences
DHS	Data handling system
DNRC	Department of Natural Resources and Conservation
DSCF	Dry standard cubic feet
DSL	Department of State Lands
EA	Environmental assessment
EIC	Environmental Information Center
EIS	Environmental Impact Statement
EIS/P&R	Emission Inventory System/Permits and Registration
EPA	United States Environmental Protection Agency
EQC	Environmental Quality Council
ESD	Environmental Sciences Division
ESP	Electrostatic precipitator
ES&T	Environmental Science and Technology

F	Fluorine (fluoride)
FAA	Federal Aviation Administration
FBC	Fluidized bed combustion
FGD	Flue gas desulfurization
FID	Flame ionization detector
FPD	Flame photometric detector
G or (g)	Grams
GC	Gas chromatography
GR or (gr)	Grains
HC	Hydrocarbons
HF	Hydrofluoric acid
HIWAY	Meteorological model for CO
HPLC	High performance liquid chromatography
H_2O	Water
H_2S	Hydrogen sulfide
H_2SO_4	Sulfuric acid
ICP/ICAP	Inductively Coupled Plasma; Inductive Coupled Argon Plasma
I/M	Inspection and maintenance
IP	Inhalable particulates
ISC	Industrial Source Complex model
JAPCA	Journal of Air Pollution Control Association
LAER	Lowest Achieveable Emission Rate
M	Meter
M^3	Cubic meters
MAAQS	Montana Ambient Air Quality Standards Study
MAPS	Montana Air Pollution Study
MCA	Montana Codes Annotated
MCAA	Montana Clean Air Act
MEPA	Montana Environmental Policy Act
MHD	Magnetohydrodynamics
MS	Mass spectrometry
MCCHD	Missoula City-County Health Department
MO	Montana Office (EPA)
Mu	Micron
NA	Neutron activation or nonattainment
NAAQS	National Ambient Air quality Standards
NADB	National Aerometric Data Bank
NADP	National Atmospheric Deposition Program
NAMS	National Air Monitoring Station
NBS	National Bureau of Standards
NDIR	Nondispersive infrared analysis
NEDS	National Emission Data System
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants

Ni	Nickel
NMHC	Non methane hydrocarbons
NMR	Nuclear magnetic resonance
NOAA	National Oceanic and Atmospheric Administration
NOx	Oxides of nitrogen
NO_2	Nitrogen dioxide
NO_3	Nitrate
NPRC	Northern Plains Resource Council
NSPS	New Source Performance Standards
NTIS	National Technical Information Service
NWS	National Weather Sevice
O	Oxygen atom
O_2	Oxygen molecule
O_3	Ozone
PAL	Point, Area and Line Source air quality model
Pb	Lead
PBL	Planetary boundary layer
PER	Preliminary Environmental Review
PM	Preventive maintenance
PM10	Particulate matter less than 10 microns in diameter
PNA	Polynuclear aromatic hydrocarbon
POM	Polycyclic organic matter
PPM	Parts per million
PSD	Prevention of Significant Deterioration
PSI	Pollutant Standards Index or pounds per square inch
PTDIS	Single stack meteorological model
PTMAX	Single stack meteorological model
PTMTP	Multistack meteorological model
P&A	Precision and accuracy
QA	Quality assurance
RACT	Reasonably Available Control Technology
RAM	Urban Air Model for point and area sources
RP	Respirable particulates
S	Sulfur
SAMWG	Standing Air Monitoring Work Group
SAROAD	Storage and Retrieval of Aerometric Data
SI	International system of units
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur dioxide
SO_4	Sulfate
SPM	Special Purpose Monitoring Station
SPSS	Statistical Package for the Social Sciences
SRM	Standard Reference Materials
SWMB	Solid Waste Management Bureau

TCM	Texas Climatological Model
THC	Total hydrocarbons
TLV	Threshold limit value
TRS	Total reduced sulfur
TSP	Total suspended particulate matter
UG/M^3 (or ug/m^3)	Micrograms per cubic meter
UNAMAP	User's Network for Applied Modeling of Air Pollution
USEPA	United States Environmental Protection Agency
V	Vanadium
VALLEY	Meteorological model for concentrations on elevated terrain
WQB	Water Quality Bureau
XRF	X-ray fluorescence
YCAPC	Yellowstone County Air Pollution Control
Zn	Zinc

APPENDIX Q

AQCR's and Area Codes

APPENDIX Q

AQCR'S AND AREA CODES

As per the Clean Air Act, the Administrator for the EPA divided the State into geographic areas or air quality control regions (AQCR). These are as follows:

AQCR	Name
140	Billings
141	Great Falls
142	Helena
143	Miles City
144	Missoula

Figure AP-1-Q shows the boundaries of Montana's five AQCR's on a map of the state.

Area codes for Montana are listed on Table AP-Q-I.

AQCR's and area codes are used by data users for requesting or processing data.

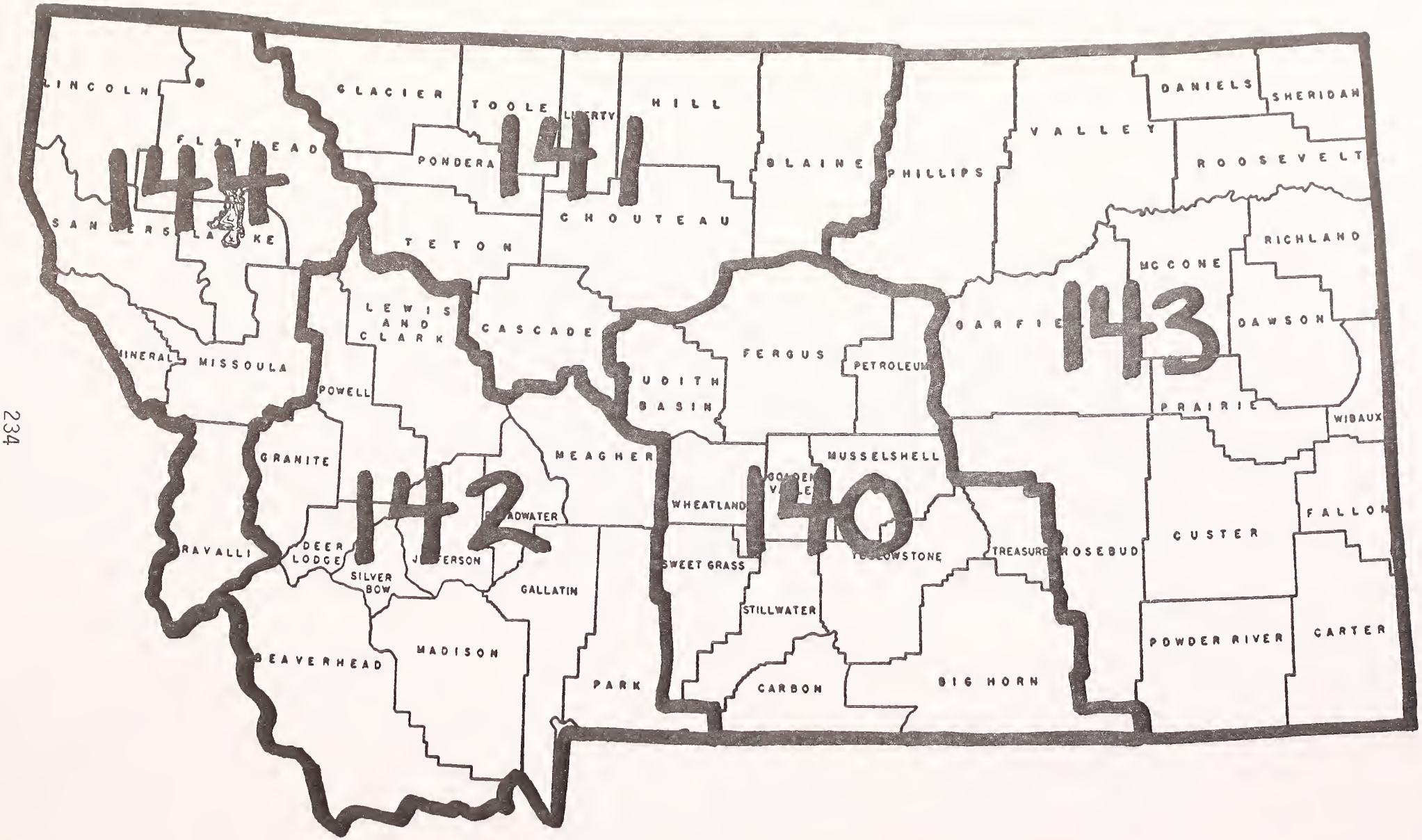

Figure AP-1-Q

MONTANA AIR QUALITY CONTROL REGIONS

Table AP-Q-I

MONTANA AREA CODES

0020 ANACONDA
0030 BAKER
0040 *BEAVERHEAD
0060 *BIG HORN
0080 BILLINGS

0100 *BLAINE
0120 BOZEMAN
0140 *BROADWATER
0160 BUTTE
0180 *CARBON

0200 *CARTER
0220 *CASCADE
0240 CENTERVILLE DUBLIN GULCH
0260 *CHOUTEAU
0270 COLUMBIA FALLS

0280 CONRAD
0300 *CUSTER
0320 CUT BANK
0340 *DANIELS
0360 *DAWSON

0380 DEER LODGE
0400 *DEER LODGE
0420 DILLON
0440 *FALLON
0460 *FERGUS

0480 *FLAT HEAD
0500 FLORAL PARK
0520 *GALLATIN
0540 *GARFIELD
0560 *GLACIER

0570 GLACIER NAT PARK
0580 GLASGOW
0600 GLENDIVE
0620 *GOLDEN VALLEY
0640 *GRANITE

0660 GREAT FALLS
0670 HAMILTON
0680 HARDIN
0700 HAVRE
0720 HELENA

0740 *HILL
0760 *JEFFERSON
0780 *JUDITH BASIN
0800 KALISPELL
0920 *LAKE

0840 LAUREL
0860 *LEWIS AND CLARK
0880 LEWISTOWN
0900 LIBBY
0920 *LIBERTY

0940 *LINCOLN
0960 LIVINGSTON
0980 *MC CONE
1000 *MADISON
1010 MALMSTROM

1020 *MEAGHER
1040 MILES CITY
1060 *MINERAL
1080 MISSOULA
1085 MISSOULA SOUTH

1090 MISSOULA WEST
1100 *MISSOULA
1140 *MUSSELSHELL
1160 *PARK
1180 *PETROLEUM

1200 *PHILLIPS
1220 *PONDERA
1240 *POWDER RIVER
1260 *POWELL
1280 *PRAIRIE

1300 *RAVALLI
1320 *RICHLAND
1340 *ROOSEVELT
1360 *ROSEBUD
1380 ROUNDUP

1400 *SANDERS
1420 SHELBY
1440 *SHERIDAN
1460 SIDNEY
1480 *SILVER BOW

1500 SILVER BOW PARK
1520 *STILLWATER
1540 *SWEET GRASS
1560 *TETON
1580 *TOOLE

1600 *TREASURE
1620 *VALLEY
1640 *WHEATLAND
1660 WHITEFISH
1680 *WIBAUX

1700 WOLF POINT
1720 *YELLOWSTONE
1740 YELLOWSTONE NAT PARK

INTERNATIONAL ATOMIC WEIGHTS 1961

BASED ON CARBON-12

	Symbol	Atomic Number	Atomic Weight
Actinium	Ac	89	[227] *
Aluminum	Al	13	26.9815
Americium	Am	95	[243] *
Antimony	Sb	51	121.75
Argon	Ar	18	39.948
Arsenic	As	33	74.9216
Astatine	At	85	[210] *
Barium	Ba	56	137.34
Berkelium	Bk	97	[249] *
Beryllium	Be	4	9.0122
Bismuth	Bi	83	208.980
Boron	B	5	10.811 [a]
Bromine	Br	35	79.909 [b]
Cadmium	Cd	48	112.40
Calcium	Ca	20	40.08
Californium	Cf	98	[251] *
Carbon	C	6	12.01115 [a]
Cerium	Ce	58	140.12
Cesium	Cs	55	132.905
Chlorine	Cl	17	35.453 [b]
Chromium	Cr	24	51.996 [b]
Cobalt	Co	27	58.9332
Copper	Cu	29	63.54
Curium	Cm	96	[247] *
Dysprosium	Dy	66	162.50
Einsteinium	Es	99	[254] *
Erbium	Er	68	167.26
Europium	Eu	63	151.96
Fermium	Fm	100	[253] *
Fluorine	F	9	18.9984
Francium	Fr	87	[223] *
Gadolinium	Gd	64	157.25
Gallium	Ga	31	69.72
Germanium	Ge	32	72.59
Gold	Au	79	196.967
Hafnium	Hf	72	178.49
Helium	He	2	4.0026
Holmium	Ho	67	164.930
Hydrogen	H	1	1.00797 [a]
Indium	In	49	114.82
Iodine	I	53	126.9044
Iridium	Ir	77	192.2
Iron	Fe	26	55.847 [b]
Krypton	Kr	36	83.80
Lanthanum	La	57	138.91
Lead	Pb	82	207.19
Lithium	Li	3	6.939
Lutetium	Lu	71	174.97
Magnesium	Mg	12	24.312
Manganese	Mn	25	54.9380
Mendelevium	Md	101	[256] *
Mercury	Hg	80	200.59
Molybdenum	Mo	42	95.94
Neodymium	Nd	60	144.24
Neon	Ne	10	20.183
Neptunium	Np	93	[237] *
Nickel	Ni	28	58.71
Niobium	Nb	41	92.906
Nitrogen	N	7	14.0067
Nobelium	No	102	[254] *
Osmium	Os	76	190.2
Oxygen	O	8	15.9994 [a]
Palladium	Pd	46	106.4
Phosphorus	P	15	30.9738
Platinum	Pt	78	195.09
Plutonium	Pu	94	[242] *
Polonium	Po	84	[210] *
Potassium	K	19	39.102
Praseodymium	Pr	59	140.907
Promethium	Pm	61	[147] *
Protactinium	Pa	91	[231] *
Radium	Ra	88	[226] *
Radon	Rn	86	[222] *
Rhenium	Re	75	186.2
Rhodium	Rh	45	102.905
Rubidium	Rb	37	85.47
Ruthenium	Ru	44	101.07
Samarium	Sm	62	150.35
Scandium	Sc	21	44.956
Selenium	Se	34	78.96
Silicon	Si	14	28.086 [a]
Silver	Ag	47	107.870 [b]
Sodium	Na	11	22.9898
Strontium	Sr	38	87.62
Sulfur	S	16	32.064 [a]
Tantalum	Ta	73	180.948
Technetium	Tc	43	[99] *
Tellurium	Te	52	127.60
Terbium	Tb	65	158.924
Thallium	Tl	81	204.37
Thorium	Th	90	232.038
Thulium	Tm	69	168.934
Tin	Sn	50	118.69
Titanium	Ti	22	47.90
Tungsten	W	74	183.85
Uranium	U	92	238.03
Vanadium	V	23	50.942
Xenon	Xe	54	131.30
Ytterbium	Yb	70	173.04
Yttrium	Y	39	88.905
Zinc	Zn	30	65.37
Zirconium	Zr	40	91.22

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